



BoilerNet Interface Controller II


IBC Technologies - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.0.60/

IBC Technologies

Site Data Logout



Boilers Responding	2	Target Temperature	86	Outdoor Temperature	71
Boilers Firing	1	Actual Temperature	85	Indoor Temperature	n/c

Boilers	Status	MBH	Supply	Return	Secondary	DHW	Psig
Boiler 01 *	Heating	15	85	86	87	n/c	5.1
Boiler 02	Standby	0	75	73	n/c	n/c	4.9
Boiler 03							
Boiler 04							
Boiler 05							
Boiler 06							
Boiler 07							
Boiler 08							
Boiler 09							
Boiler 10							
Boiler 11							
Boiler 12							

Done

<IBCGpc>

12.6 °C

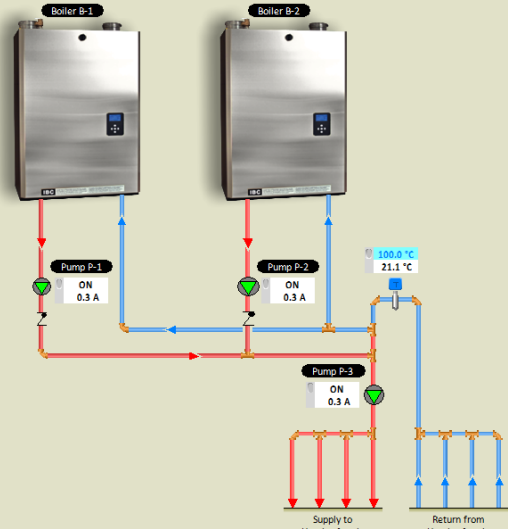
Boiler System

Aug-09-2011

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BACnet Interface

Boiler 1	Boiler 2	
67.0 °C	66.3 °C	Supply Temp
63.1 °C	62.8 °C	Return Temp
61.0 °C	60.7 °C	Secondary Temp
42.4 °C	41.0 °C	DHW Temp
32.0 psi	32.0 psi	Outlet Pressure
32.0 psi	32.0 psi	Inlet Pressure
32.0 GPM	32.0 GPM	Flow Rate
1750 RPM	1750 RPM	Fan Speed
100 Pa	100 Pa	Fan Pressure
10 Pa	10 Pa	Offset Pressure
24.0 °C	24.0 °C	Master Target Temp
24.0 °C	24.0 °C	Master Actual Temp
24.0 °C	24.0 °C	Master Outdoor Temp
24.0 °C	24.0 °C	Master Indoor Temp



For the latest version of this and other manuals, as well as information regarding new software releases, new and current products, technical bulletins, etc., please consult the IBC Web Site:

www.ibcboiler.com

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Introduction

The IBC BoilerNet Interface Controller ("BIC") provides both Web and BACnet/IP interfaces to IBC's line of high efficiency condensing boilers, including the VFC 15-150, VFC 45-225, SL 80-399, and others. It can interface from 1 to 24 IBC boilers using IBC's BoilerNet communications interface.

1 Configuration

Important: The BoilerNet Interface Controller must be configured before it is put into use on your network. An improperly configured BIC will not function correctly, and could affect the operation of other devices on your network.

In general, you should contact your Network Administrator for assistance with configuring the BoilerNet Interface Controller. Proper IP and BACnet addresses must be assigned to the BIC for correct operation. Your network administrator will also likely want to know that a new device is being put into service on your network.

1.1 IP Setup

A static IP address is highly recommended for the BoilerNet Interface Controller. If just the BACnet/IP interface is being used without a BBMD, then a dynamic IP address may be obtained from a DHCP server. However, if the Web Server interface or a BBMD is being used, then a static IP address is generally required.

Note that if the BACnet/IP interface is being used, the BIC must generally be on the same network segment, and the IP address in the same subnet, as the other BACnet devices on the network it is intended to be communicating with. If BACnet/IP routing to other network segments, subnets, or to the Internet is required, then a BACnet BBMD or other such routing device must already be present and properly configured on the network. It should be noted that a standard network router will generally not correctly route BACnet/IP packets; a BACnet BBMD or other BACnet specific routing device is required.

While any IP address can be assigned to the BIC II, it is highly recommended that only a "local" IP address be assigned. If access to the BIC II from the Internet is desired, using either the Web or the BACnet interfaces, it should only be from behind a properly configured firewall and/or router. Directly connecting the BIC II to the internet without the use of a firewall is not recommended or approved of by IBC. Please contact your network administrator for assistance.

1.2 BACnet Setup

A unique BACnet Device ID is required for every BACnet device on a network, including the BIC II. The BIC II will use the standard BACnet port number of 47809 (0xBAC1) by default, though this may be different at your site, particularly if a BACnet router or BBMD is in use.

Please contact your network administrator to obtain an IP address, BACnet Device Identifier, and the port number for the BoilerNet Interface Controller, or any other TCP/IP or BACnet configuration assistance.

1.3 Configuring Site and Alert Data

Important:

- Do not remove or insert the SD-Card from the BoilerNet Interface Controller while it is powered on. Doing so could result in data loss, and/or corruption of the SD-Card.
- The SD-Card must be writable (not "locked") while in use in the BIC II.

All system configuration data is stored in the "ibc" directory on the BIC II's SD-Card.

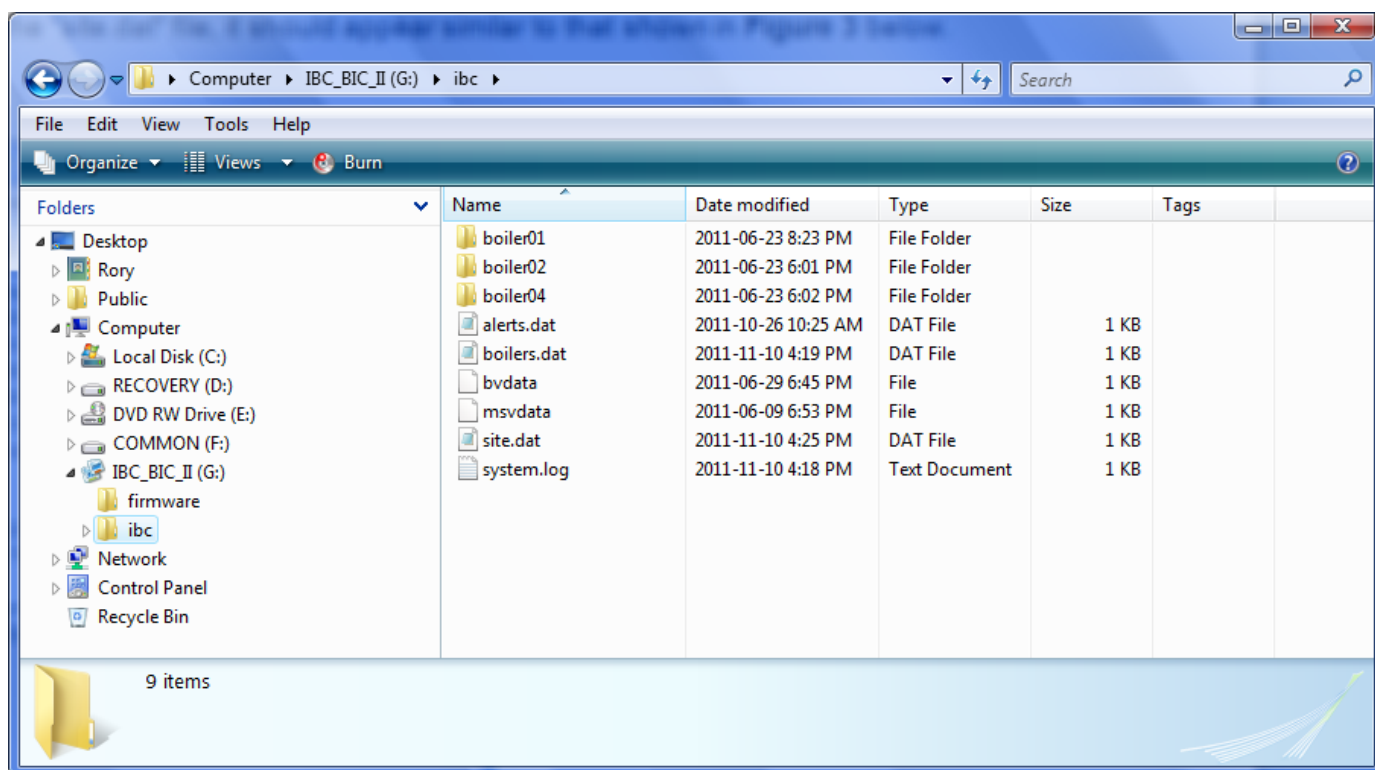


Figure 1

The site information must be entered into the "site.dat" file, and optionally the "alerts.dat" file before the BoilerNet Interface Controller can be used. There are many text editors (WordPad®, for example) can be used to edit these files (please note that Windows NotePad® cannot be used). A computer with an appropriate operating system and a "SD" card slot is required. Most versions of Windows®, Linux®, or MAC® O/S should have a text editor that can be used to edit the "site.dat" and "alerts.dat" files. The example shown here is using Windows WordPad.

Please note that some versions of Windows, particularly XP, may not properly recognize the FAT partition on the SD-Card. DO NOT allow Windows to format the SD-Card if a prompt to this affect appears. Cancel the operation, and use a computer with a more current version of Windows (or another O/S) and up-to-date drivers and service patches, that properly recognizes the SD-Card.

Important:

When editing the files:

- Do not alter any characters before the "=" sign in each line.
- Do not enter a "\" or any other non-standard characters into any of the fields.
- Do not alter any file other than the "site.dat" file on the SD-Card.
- The file name is case sensitive. Do not alter or rename it.
- After saving the settings, you should use the "Safely Remove" option in your computer's operating system (if available) before removing the SD-Card from your computer.

1.3.1 Configuring Site Data

When you open the "site.dat" file, it should appear similar to that shown in **Figure 2** below.

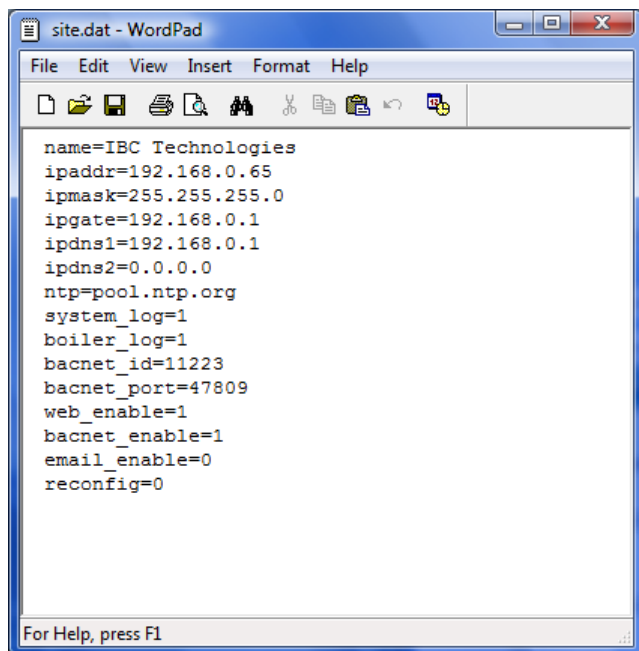


Figure 2

Table 1 - "site.dat" Field Description

Field	Field Name	Field Description	Max. Size
1	name	The site name	40
2	ipaddr	The IP address to be used ⁽¹⁾	20
3	ipmask	The subnet mask ⁽¹⁾	20
4	ipgate	The default gateway ⁽¹⁾	20
5	ipdns1	The primary DNS server ⁽¹⁾	20
6	ipdns2	The secondary DNS server ⁽¹⁾⁽²⁾	20
7	ntp	The ntp server ⁽³⁾	20
8	system_log	Set to "1" to enable system logging, "0" to disable	1
9	boiler_log	Set to "1" to enable the boiler event logging, "0" to disable ⁽⁴⁾	1
10	bacnet_id	The devices BACnet Identification number	32 bit integer
11	bacnet_port	The BACnet port number (typically 47808)	16 bit integer
12	web_enable	Set to "1" to enable the Web (Internet) interface, "0" to disable ⁽⁵⁾	1
13	bacnet_enable	Set to "1" to enable the BACnet interface, "0" to disable ⁽⁵⁾	1
14	email_enable	Set to "1" to enable E-Mail Alerts, "0" to disable ⁽⁶⁾	1
15	reconfig	Set to "1" to save the setting to internal FLASH and then use the new settings.	1

-
- (1) If a dynamic IP address is to be obtained from a DHCP server, then "ipaddr", "ipmask", "ipgate", "ipdns1", and "ipdns2" should all be set to "0.0.0.0" (a dynamic IP address is generally not recommended).
 - (2) "ipdns2" is optional. Set to "0.0.0.0" if not used.
 - (3) If a ntp server is specified, then the BACnet Time Synchronization will not be used. To use the BACnet Time Synchronization, the ntp server parameter should be set to "0.0.0.0". Note that the BIC will only use the first BACnet time synchronization message it receives after it starts-up. Subsequent time-sync messages will be ignored.
 - (4) This feature is not implemented in V1.0 of the BoilerNet Interface Controller.
 - (5) Enable one or both of these options.
 - (6) The SMTP server information in the "alerts.dat" file must be configured before enabling this option.

Important: For the BIC II to use the new settings, you must set the "reconfig" flag to "1" before saving the file. On start-up, the BIC II reads the "site.dat" file and checks the state of this flag. If set, it copies these settings to its internal configuration registers, resets the flag, and then starts the system using the new settings. Be sure to record the configuration settings, or make a backup of the "site.dat" file if you alter it.

It will take approximately 3 to 4 minutes for the BIC II to restart when the settings have been altered.

1.3.2 Configuring the Alert Data

The "Alert Data" contains the information for accessing a SMTP mail server, allowing E-Mail Alerts to be sent in the event a problem with a boiler is detected. All site information is stored in the **"alert.dat"** file in the "ibc" directory on the BIC's SD-Card.

When you open the "site.dat" file, it should appear similar to that shown in **Figure 4** below.

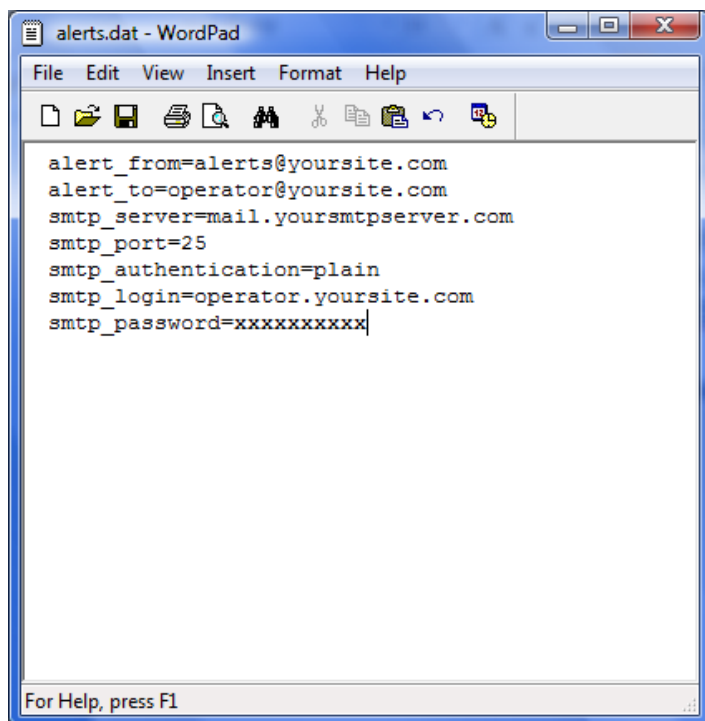


Figure 3

Table 2 - "alert.dat" Field Description

Field	Field Name	Field Description	Max. Size
1	alert_from	E-Mail "from" name	40
2	alert_to	E-Mail address the alert will be sent to	40
3	smtp_server	name or IP address of the SMTP mail server	40
4	smtp_port	SMTP server port to be used	16 bit integer
5	smtp_authentication	SMTP sever authentication type	10
6	smtp_login	SMTP server login name	40
7	smtp_password	SMTP server password	20

2 SD-Card

The BoilerNet Interface Controller requires a standard Secure Digital Flash Card (SD-card) for operation.



Figure 4

The BIC II can support both "standard" and "SDHC" SD-Cards. A 2GB SD-card is more than sufficient for the BIC's operation.

IBC will typically supply a SD-Card with the BIC. Please contact IBC if a new or replacement SD-Card is required. The SD-Card is specially formatted with both a Windows compatible partition, and a "hidden" partition that typically cannot be accessed by a Windows based computer. Do not reformat or repartition the SD-Card.

Important:

- Do not remove or insert the SD-Card from the BoilerNet Interface Controller while it is powered on; doing so could result in data loss, and/or corruption of the SD-Card.
- The BoilerNet Interface Controller will not function, or will stop functioning, if the SD-Card is not present or is removed.
- The SD-Card must be writable (not "locked") while in use in the BIC.
- A card with a speed class of 4 or higher (minimum 4MB/second write speed) is required.

3 Installation

The BoilerNet Interface Controller requires a Network (Ethernet) cable connection to the network it is to be connected to, a BoilerNet twisted pair connection to the boilers, and a power source.

3.1 Location

Typically the BIC II will be installed in the same room as the boilers it will be interfacing to. It can also usually be installed in a location remote to the boiler room if required. Note that the total length of the BoilerNet twisted pair wire is limited, and is generally shorter than the permitted length of the network (Ethernet) cable. Therefore, it is usually better to extend the network cable to BIC II's location instead of extending the BoilerNet twisted pair wiring to a remote location.

Also note that the maximum length of both the BoilerNet twisted pair and the network cable will vary depending on the environmental conditions at your site. In general, keep all cable runs as short as possible. Also try to keep data and power cables separated.

3.2 Power and Enclosures

The BoilerNet Interface Controller II requires a power source of 5VDC at 7.5 watts minimum. This is typically supplied from a 120VAC switching power adapter; therefore there should be a 120VAC outlet located reasonably close to where the BIC will be located. Other power supply options, including 100 to 240VAC are available, as well as Power over Ethernet (PoE).

The standard enclosure for the BoilerNet Interface Controller is not a NEMA rated enclosure, and therefore it needs to be located in a protected area away from moisture, temperature extremes, and dust. NEMA rated enclosures for the BIC II can be supplied by IBC if required.

Please contact IBC Technologies for additional installation options and information.

3.3 BoilerNet Connections

The BoilerNet Interface utilizes a 2-wire CAN-bus communications interface between the boilers and the BIC II. BoilerNet wiring needs to be performed in accordance to published standards, such as ISO 11898 or SAE J2284.

A suitable cable, compliant with standards such as ISO 11898 or SAE J2284 must be used. The wiring must also be installed in compliance with these standards.

Cerco Cable manufactures cable suitable for CAN-bus use. Cerco AT-HOM 29 #8320, or cable with equivalent specifications from another cable manufacturer, must be used. The general specifications for this cable are:

- 24 AWG shielded twisted pair
- 9 twists per foot
- Capacitance 12.5pF/Ft (cond./cond.)
- Resistance 25.5 ohms/1000'

Full specifications and information can be found on the Cerco web site: <http://www.cercocable.com>. Please contact IBC if any additional information is required.

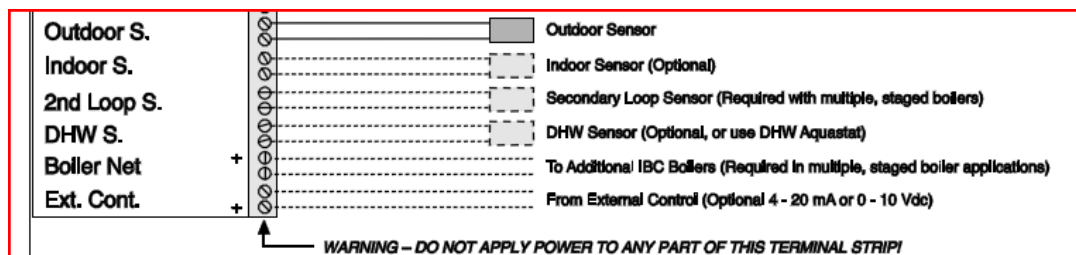


Figure 5

On the boiler's controller board, the "Boiler Net +" is the "CANH" connection, the other terminal is "Boiler Net -", which is the "CANL" connection. On the BIC II terminal block, the red wire is the "Boiler Net +" (CANH) connection; the white is the "Boiler Net -" (CANL) connection.

Please note that the BIC II has a 120 ohm CAN-bus terminator built into the controller board, which cannot be disabled. Therefore, the BIC II must be wired in as either the first or last device in the BoilerNet communications chain. The termination jumper (JA02) needs to be removed from all the boiler controller boards with the exception of the first or last boiler of the BoilerNet chain. Please refer to **Figure 6** below for an example diagram.

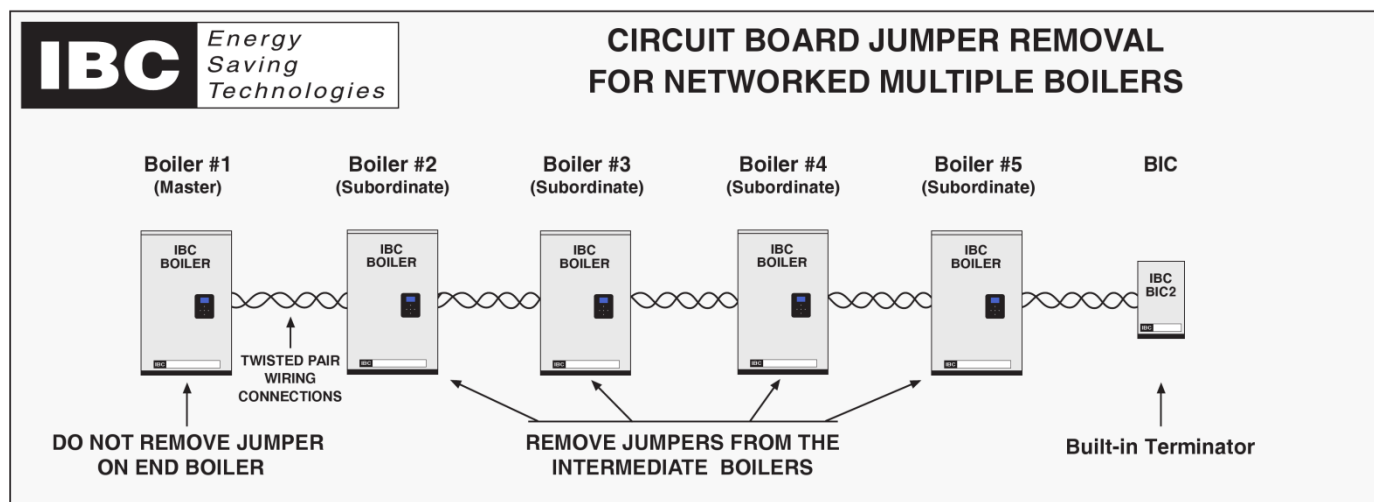


Figure 6

Please also refer to IBC document "**Tech Memo 2310081 – Multiple Boiler Systems**" for additional information.

Important: The BoilerNet (CAN-bus) interface on both the BIC II and the boiler's controller can be damaged by static electricity and other stray voltages and currents. Proper precautions must be used when installing and handling the communications cable and wiring. DO NOT use a continuity tester, or any other test equipment not specifically designed for use with CAN-bus equipment, without first disconnecting all devices connected to the CAN-bus network. All devices must also be powered off before connecting or disconnecting devices. Failure to do so can result in damage to the BIC II and/or the boiler's controller board, which will not be covered under warranty.

3.4 Configuring the Boilers

All the boilers that the BoilerNet Interface Controller is to interface with, and the BIC II itself, must be connected to the same BoilerNet (twisted-pair) network. Every boiler needs to be assigned a unique Boiler ID. This must be performed through the user interface on the boiler.

Typically the boilers will have been setup for Multi-Boiler operation with one boiler (usually Boiler ID: 1) designated as the master. It is possible that the boilers will be operating independently, without a boiler being designated as a master. In this case, each boiler must still be assigned a unique Boiler ID.

Note: Boiler firmware version 3.00.0 or newer is required for operation with the BoilerNet Interface Controller. Please contact IBC if you boiler(s) require a firmware upgrade.

For more information regarding Multi-Boiler operations, please refer to IBC document "**Tech Memo 2310081 – Multiple Boiler Systems**". Also please consult the boiler's User Manual for information on setting up and configuring your boiler(s).

3.5 Operation

The BoilerNet Interface Controller's operation is fairly straight forward. Insert the configured SD-Card into the BIC II's SD slot, ensure the BoilerNet cables are connected, and if not using PoE, that the Ethernet cable is connected. Then apply the power by connecting either the external 5VDC power supply, or if using PoE, connect the Ethernet cable. You should see a green "power" light on the BIC II, as well as activity on the network connector.

Important: Connect only one of the power sources to the BIC II. DO NOT use both the external 5VDC power supply and PoE simultaneously; doing so may result in damage to the BIC II and/or the power supplies.

If this is the first power-up of the BIC II for a new installation, then all the boilers that the BIC II will be interfacing with need to be powered up and properly configured with a Boiler ID before the BIC II is powered on. If a new boiler is ever added to the system, the BIC II will need to be restarted before it will see the new boiler.

Note that it takes approximately 2 minutes for the BoilerNet Interface Controller II to initialize before the BACnet or web interfaces will be available. For a first time start-up, or if Network and/or BACnet settings have been changed, the start-up time will be approximately 4 minutes.

4 Web (HTML) Interface

Once each Boiler has been assigned a Boiler ID through the boiler's control panel, all other settings for the boiler can be configured using the BoilerNet Interface Controller's Web Interface. Multiple individual boilers can also be monitored simultaneously.

The Web Interface screens generally mirror the screens available through the boiler's controller LCD screen and keypad. Please refer to user manual for your boiler for a description of all the individual fields and their values. This manual assumes that the user is experienced in the setup and use of IBC boilers, and boiler systems and installations in general.

Most standard web browsers, such as Mozilla Firefox[®], Microsoft Internet Explorer[®], or Google Chrome[®], can be used for accessing the BIC's Web Interface. Typically the IP address assigned to the BIC II will be entered directly (as shown in **Figure 7**), though this may vary depending on the configuration of your network.

The BIC II's Web Interface requires the use of cookies, so you will need to configure your web browser to allow cookies for the BIC II's "site" address. You may need to configure your browser to allow pop-up windows for the BIC II as well. Most browsers can also be configured to display a new window as either a "window" or a "tab", depending on your personal preference (the examples here are shown as "tabs").

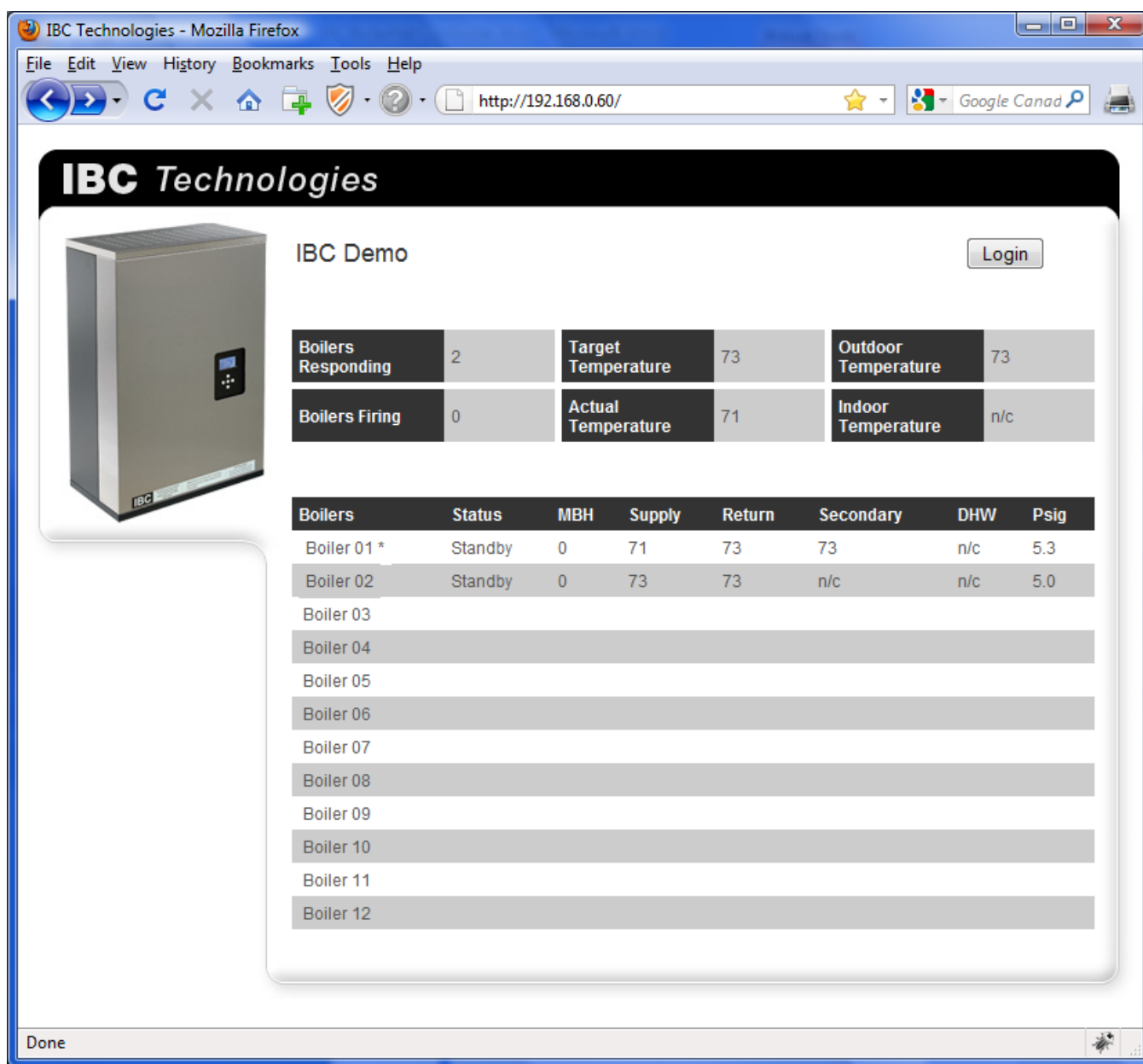


Figure 7

Only basic information regarding the BoilerNet system will be initially displayed on the opening screen. You must "Login" using a valid user name and password to be able to access and alter detailed information regarding the BIC II and the individual boilers on the network.

Some Web Interface screens may not be available to a user, depending on the security level that they have been assigned. Other screens may be viewable, but altering and saving setting values will not be permitted.

The Web Interface and the boiler's screen and keypad should not be used simultaneously for entering or altering settings. If a key on the boiler's keypad is pressed, then the Web Interface will be "locked out" for a period of 2 minutes from the last key press; the operator at the boiler is given control. Viewing of settings using the Web Interface will still be permitted, but any settings changed using the Web Interface will not be saved until the lock-out period has expired. Note that the lock-out will apply to all web screens, regardless of the screen the boiler or the Web Interface happens to be on at the time.

It is highly recommended that you log out of, or close, the BoilerNet Web Interface when it is not actually in use.

4.1 User Passwords

The Web Interface employs a password system to control access. Up to 10 User Accounts can be configured.

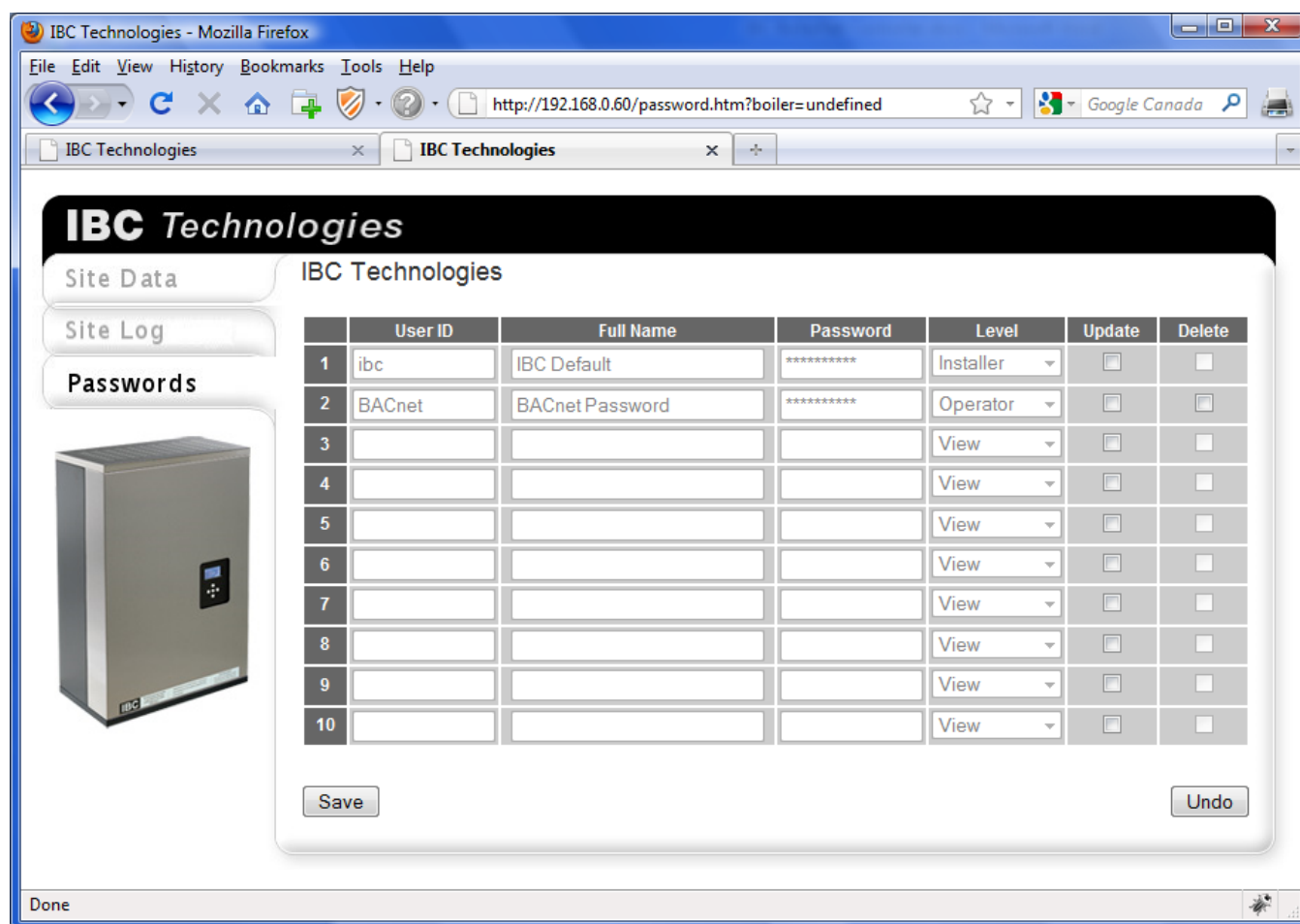


Figure 8

Note that both the "User ID" and "Passwords" are case sensitive, both on this screen and when logging in using the Web interface.

To add or change an entry, click the "Update" box for that entry first, then add or change the entry's data. When all the desired updates have been done, click "Save". The User information will be saved by the system, and the web page will be updated to reflect the changes.

Table 3 – Security Levels

Level	Description
View	View access only; access to certain screens is restricted
Operator	Equivalent to the "User" access level on the boiler's controller
Supervisor	View access to all screens, write access to all but "advanced" functions
Installer	Full read/write access to all screens and functions

Generally, the "View" and "Operator" levels should be assigned to most users. "Supervisor" and "Installer" levels should only be assigned to select personnel.

There are 2 default User ID's that will have been factory configured. User ID "ibc" is the default for all operations, while User ID "BACnet" is for any BACnet operations that require a password. The password for both ID's is set to "boiler" from the factory.

The "ibc" User ID cannot be deleted. It is however strongly recommended that the default password be changed before the BIC is put into actual operation.

The "BACnet" User ID is required for any BACnet operations that use a password. Note that the security level is not relevant for BACnet operations; the presence of the "BACnet" User ID and correct password are what are required. If the BACnet interface is not being used, then this User ID can also be deleted if desired. It is also strongly recommended that the default password be changed before the BIC II is put into actual operation.

4.2 Site Data

The "Site Data" screen allows all the information in the "site.dat" file to be configured. Note that this screen is not accessible until after an IP address has been initially assigned through editing the "site.dat" file, and the BoilerNet Interface controller is up and running. Please refer to **"1.3 - Configuring Site and Alert Data"** for more information.

IBC Technologies	
Site Name	IBC Technologies
IP Address	192.168.0.65
Net Mask	255.255.255.0
Gateway	192.168.0.1
DNS 1	192.168.0.1
DNS 2	0.0.0.0
NTP Server	pool.ntp.org
BACnet ID	11223
BACnet Port	47809
Display Units	Metric
E-Mail Alerts	No
System Logs	Yes
Boiler Logs	Yes
Reboot BoilerNet Controller?	No

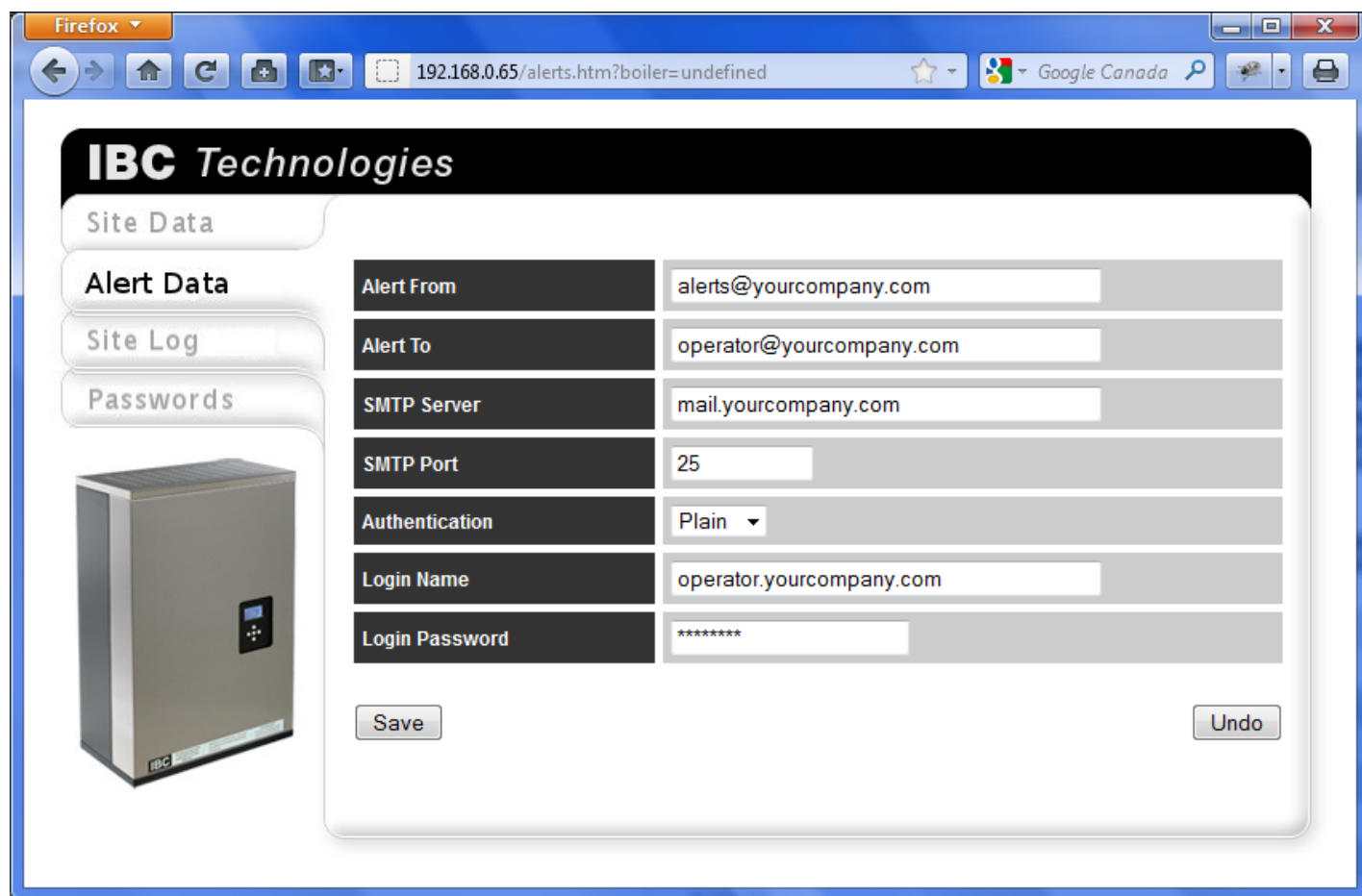
Save Undo

Figure 9

-
- Note that for all fields except "Site Name", "Display Units", "E-Mail Alerts", "System Logs", and "Boiler Logs", the BoilerNet Interface Controller will need to be rebooted before the changes will take effect.
 - Setting the "Reboot BoilerNet Controller" to "Yes" will cause the controller to reboot after the "Save" button is clicked.
 - If you are rebooting the IBC, make sure that it is not in use by anyone else before it is rebooted. It will take approximately 3 to 4 minutes for the BIC II to reboot when network or BACnet settings are altered.
 - If "Metric" is selected for the "Display Units", values will be displayed as °C, meters, and kPa as appropriate. If "Imperial" is selected, values will be displayed as °F, feet, and psi. Note that the "Display Units" field only affects the units displayed on the Web Interface. The settings on neither the individual boilers nor the BACnet interface are altered. Any open Web Interface pages will need to be "reloaded" before the new unit setting will take effect.
 - If the IP address was changed, the new IP address will need to be used to access the BIC II again for both the Web and BACnet interfaces after the reboot has completed.
 - The IP settings should only be changed on the advice of your Network Administrator. Using incorrect IP or BACnet parameters could cause the BIC II to become inaccessible, and could also affect the operation of other devices on the network.
 - Before enabling the "E-Mail Alerts", the E-Mail Alert data must be configured first; refer to section **"4.3 - Alert Data"**.

4.3 Alert Data

The BIC II can be configured to send an E-Mail alert when a problem is detected with a boiler. This screen allows the information in the "alert.dat" file to be configured, which contains the information for the SMTP server to be used for sending the E-Mail through.



The screenshot shows a web browser window with the address bar displaying "192.168.0.65/alerts.htm?boiler=undefined". The page title is "IBC Technologies". On the left, there is a sidebar with four buttons: "Site Data", "Alert Data" (which is highlighted), "Site Log", and "Passwords". Below these buttons is a small image of a grey IBC boiler unit. The main content area is titled "Alert Data" and contains a form with the following fields:

Alert From	alerts@yourcompany.com
Alert To	operator@yourcompany.com
SMTP Server	mail.yourcompany.com
SMTP Port	25
Authentication	Plain
Login Name	operator.yourcompany.com
Login Password	*****

At the bottom of the form, there are two buttons: "Save" and "Undo".

Figure 10

Please contact your System Administrator or your Internet Service Provider for the information required for accessing your SMTP Mail Server (hint: you may be able to find this information in the "Account Settings" for your E-Mail client).

Once the SMTP server information is configured, the "E-Mail Alerts" option must be enabled in the "Site Data" screen; refer to section **"4.2 - Site Data"**.

4.4 Site Log

This is the event log for the BoilerNet Interface Controller. This displays events for the BIC II itself. For the logs for the individual boilers, please refer to sections "4.14 - Boiler Logs" and "4.15 - Boiler Error Logs".



Figure 11

4.5 System Status Display

An example of the System Status Display is shown below:

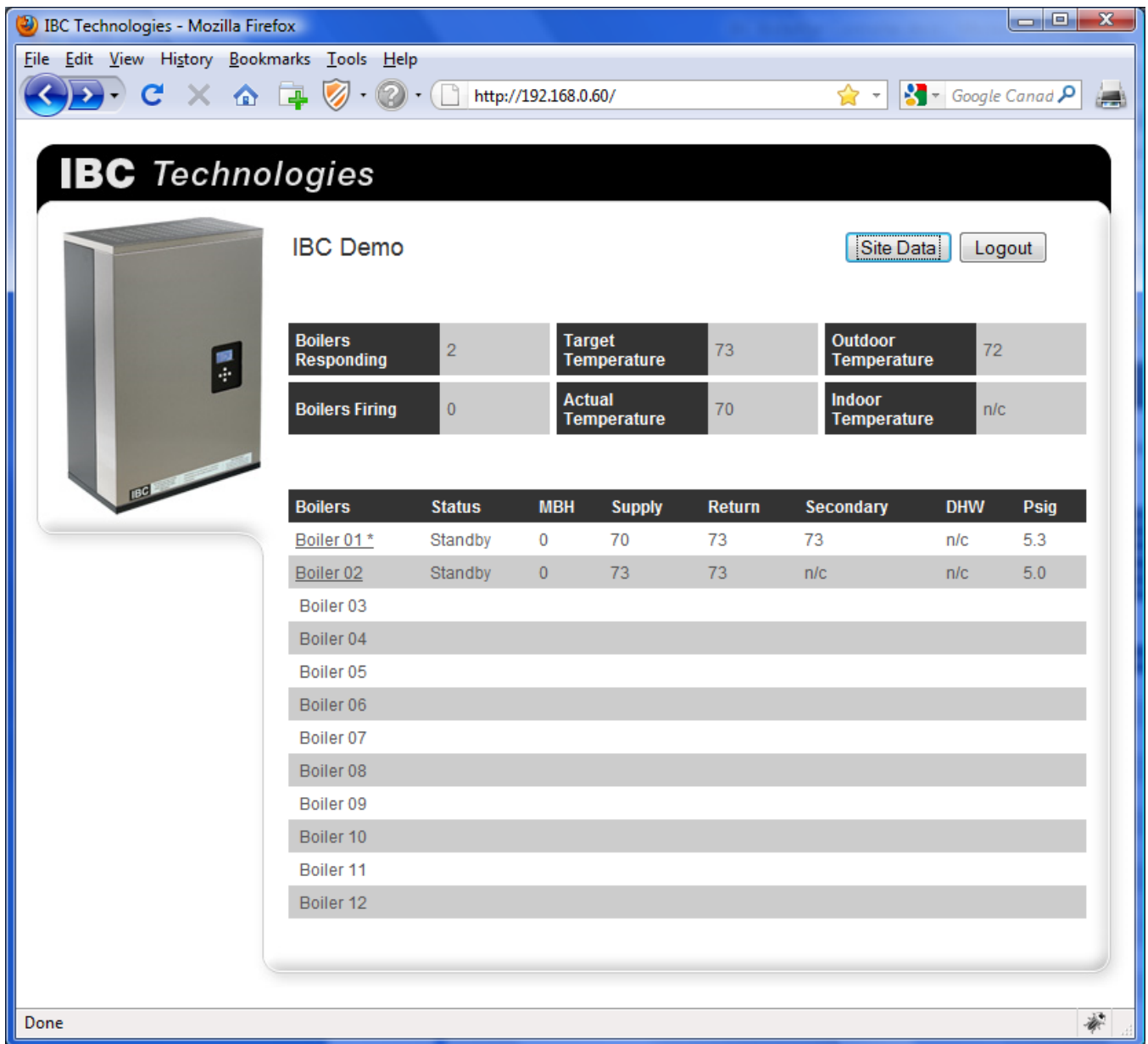


Figure 12

- Note that in this example there is a * after Boiler 01; this indicates that this boiler is the "Master" boiler in the system.

-
- If there is no master boiler in the system, then "Boilers Responding" and "Boilers Firing" are not applicable, and "Target", "Actual", "Outdoor" and "Indoors" temperatures will be displayed from the first online boiler in the list.
 - If a Boiler is shown in red (e.g. [Boiler 01](#)), this indicates that there is an Error or Warning message present for that boiler. Clicking the boiler will take you to the Boiler Status Display, where you will be able to see any Error and/or Warning messages, along with a detailed status display for the boiler.

4.6 Boiler Status Display

This is the main status of an individual boiler on the network. All settings and information regarding the boiler is subsequently accessed from this screen.

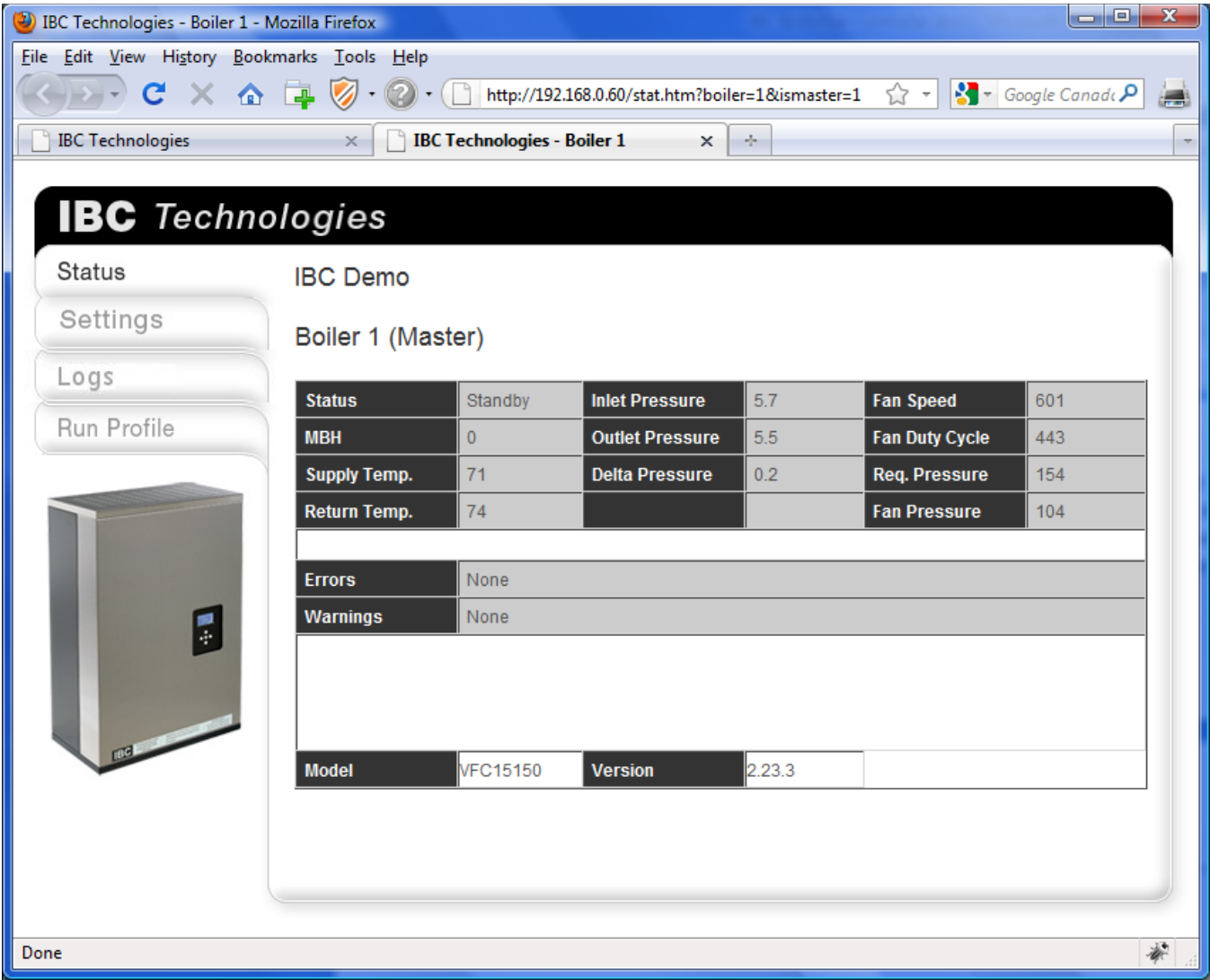


Figure 13

4.7 User Settings

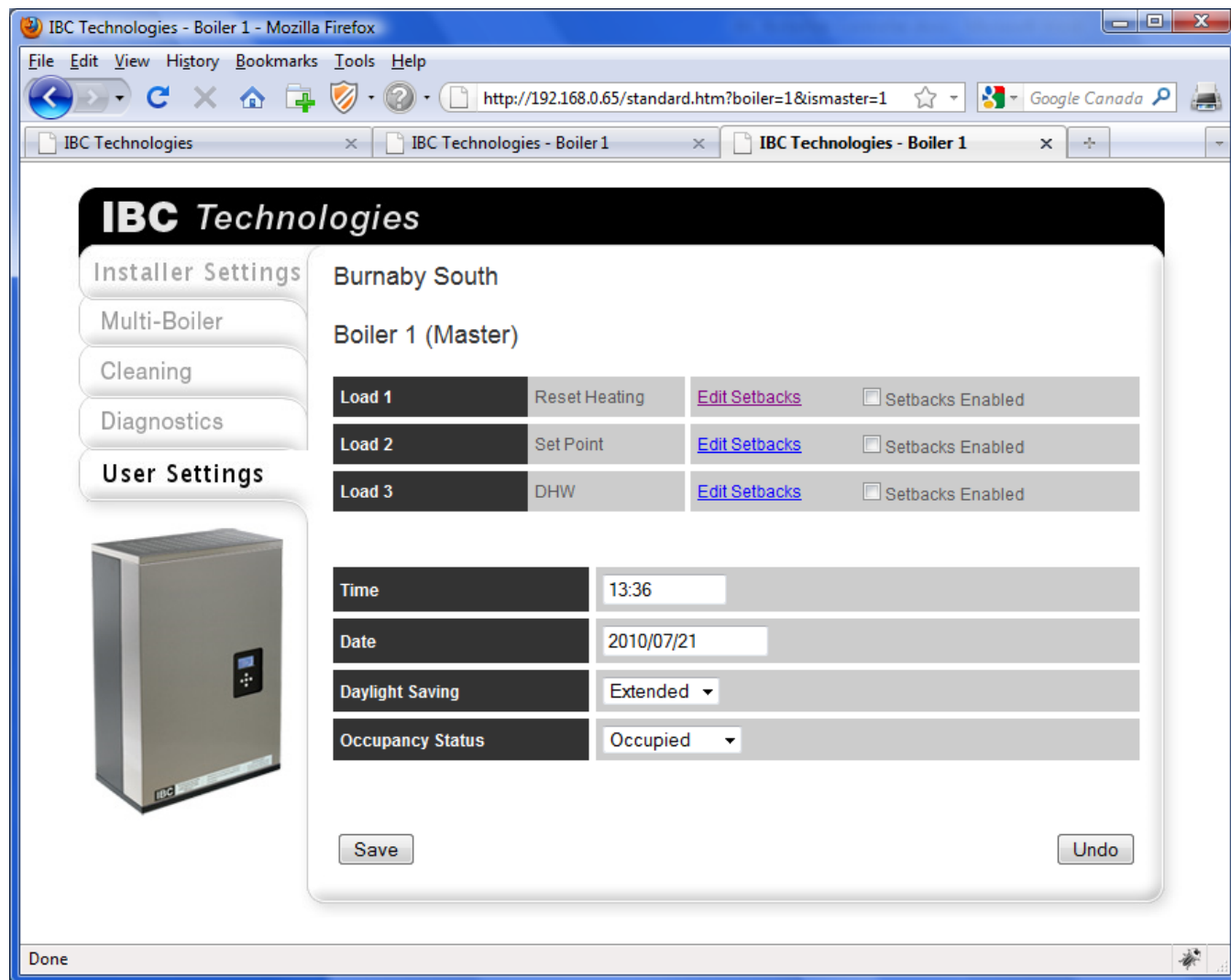


Figure 14

4.8 Setbacks

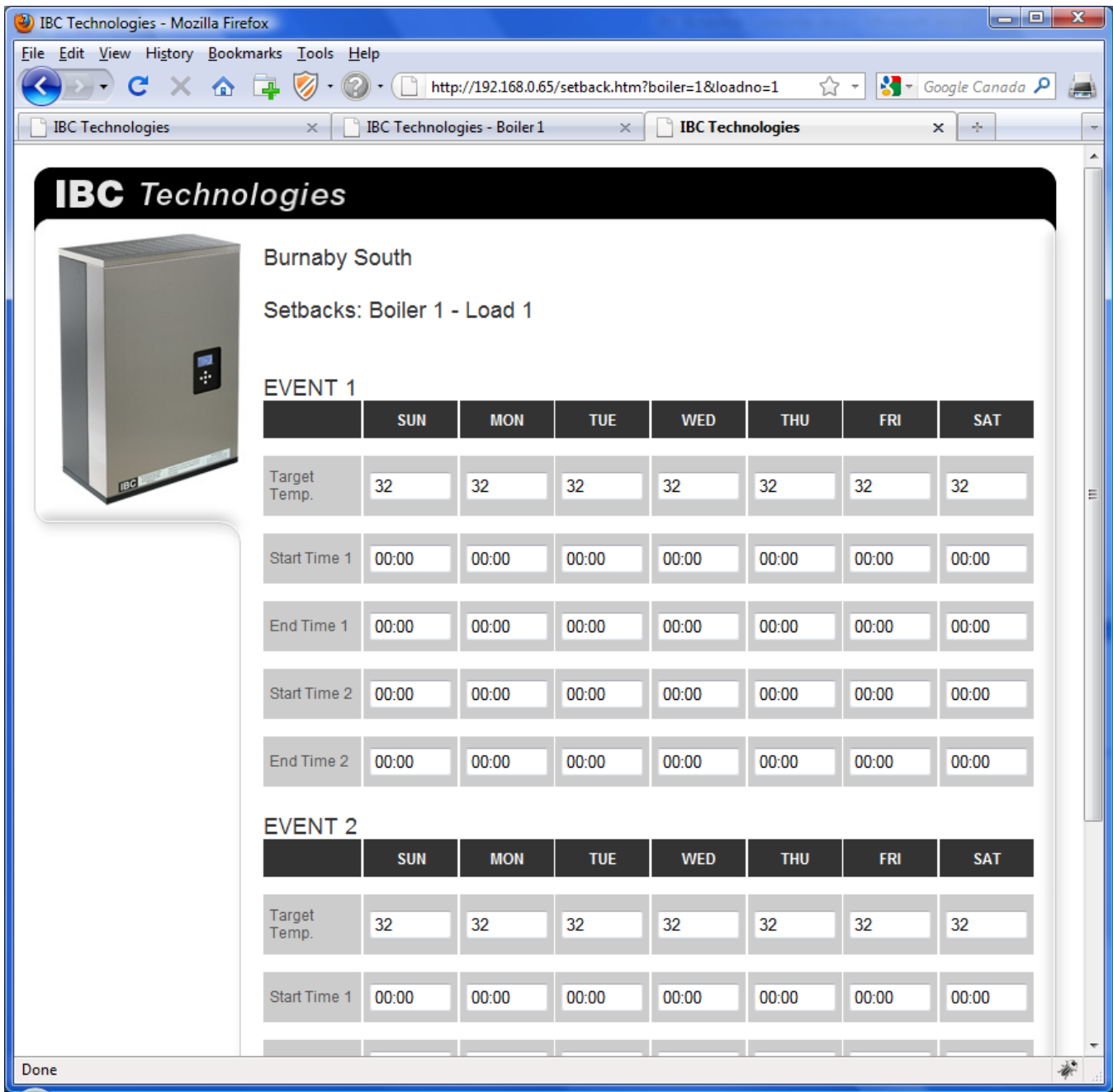


Figure 15

- Note that the boiler's use of the setbacks is controlled on the "4.7 - User Settings" screen.

4.9 Installer Settings

IBC Technologies - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.0.65/advanced.htm?boiler=1&ismaster=1

IBC Technologies IBC Technologies - Boiler 1 IBC Technologies

IBC Technologies

Installer Settings Burnaby South

Multi-Boiler

Cleaning

Diagnostics

User Settings

Boiler 1 (Master)

Load 1	Reset Heating	Edit Settings
Load 2	Set Point	Edit Settings
Load 3	DHW	Edit Settings

Altitude	0
Load Control	Pumps
Primary Pump Purge Time	300
Pump Purge Enable	Off
VS Output	Pump
Min. Variable Speed %	28
Max. Variable Speed %	100
Fire Delay	On

Save Undo

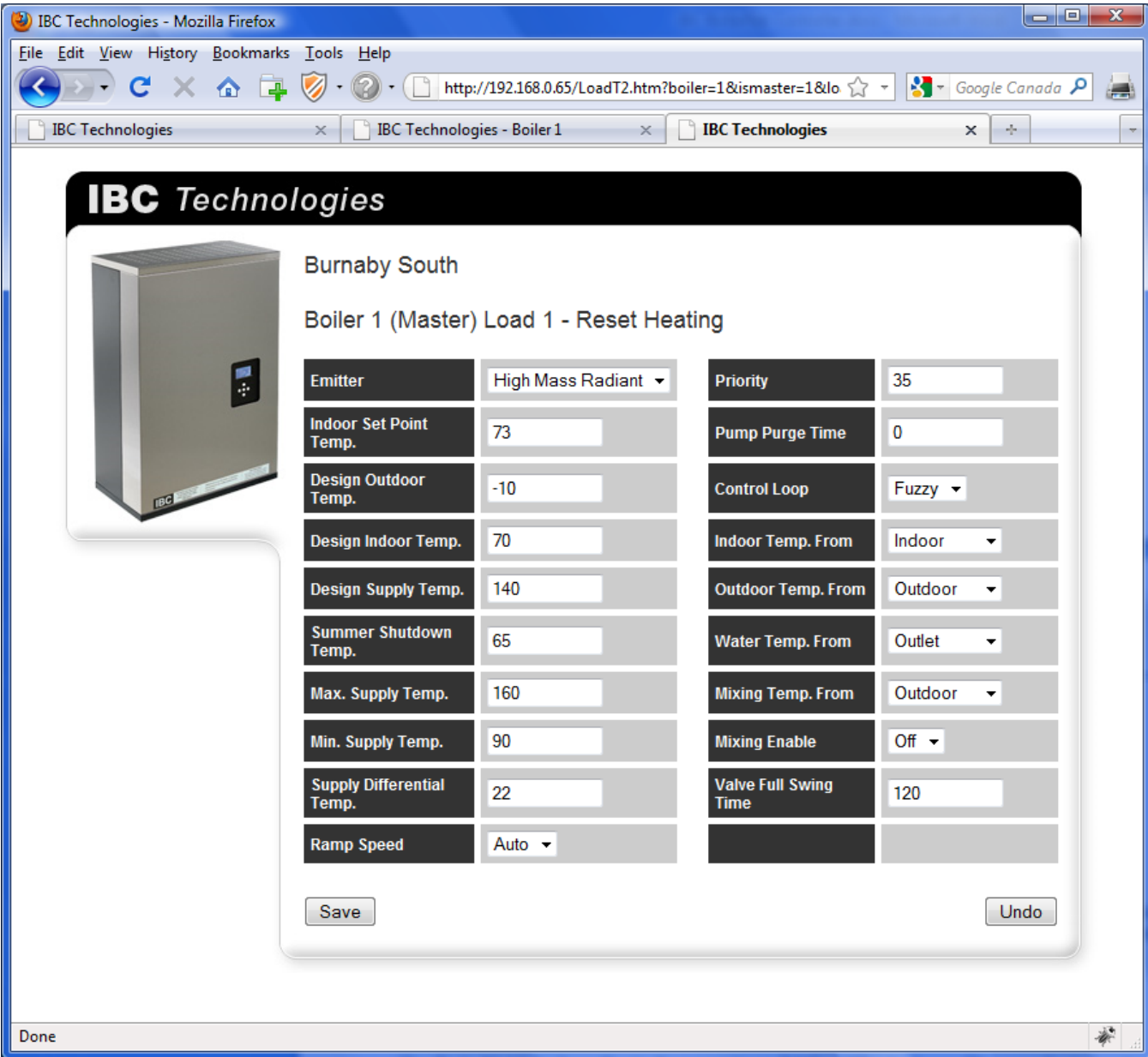
Figure 16

- To alter the "Load Type" for a load, select the desired Load Type from the pull-down box, then select "Save". Once the "Load Type" is set to the desired type, you can then edit the settings for the load.
- Do not alter the load settings before changing the "Load Type". Changing the "Load Type" may set some of the values for the load back to the system default value, and your altered settings will be lost.

-
- Whenever the "Load Type" is altered, always verify that the settings for the load are indeed correct for your system. As previously mentioned, if the "Load Type" is altered, some of the Load Settings may be reset to the system default values.

4.10 Load Settings

An example of the screen for a "Reset Heating" load is shown below. The actual fields displayed will vary by the Load Type selected. If the Load Type is altered through **"4.9 - Installer Settings"**, always verify that the load settings are in fact correct for your system.



IBC Technologies - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.0.65/LoadT2.htm?boiler=1&ismaster=1&lo

IBC Technologies - Boiler 1

IBC Technologies

Burnaby South

Boiler 1 (Master) Load 1 - Reset Heating

Emitter	High Mass Radiant	Priority	35
Indoor Set Point Temp.	73	Pump Purge Time	0
Design Outdoor Temp.	-10	Control Loop	Fuzzy
Design Indoor Temp.	70	Indoor Temp. From	Indoor
Design Supply Temp.	140	Outdoor Temp. From	Outdoor
Summer Shutdown Temp.	65	Water Temp. From	Outlet
Max. Supply Temp.	160	Mixing Temp. From	Outdoor
Min. Supply Temp.	90	Mixing Enable	Off
Supply Differential Temp.	22	Valve Full Swing Time	120
Ramp Speed	Auto		

Save Undo

Done

Figure 17

4.11 Multi-Boiler Settings



Figure 18

4.12 Cleaning Information

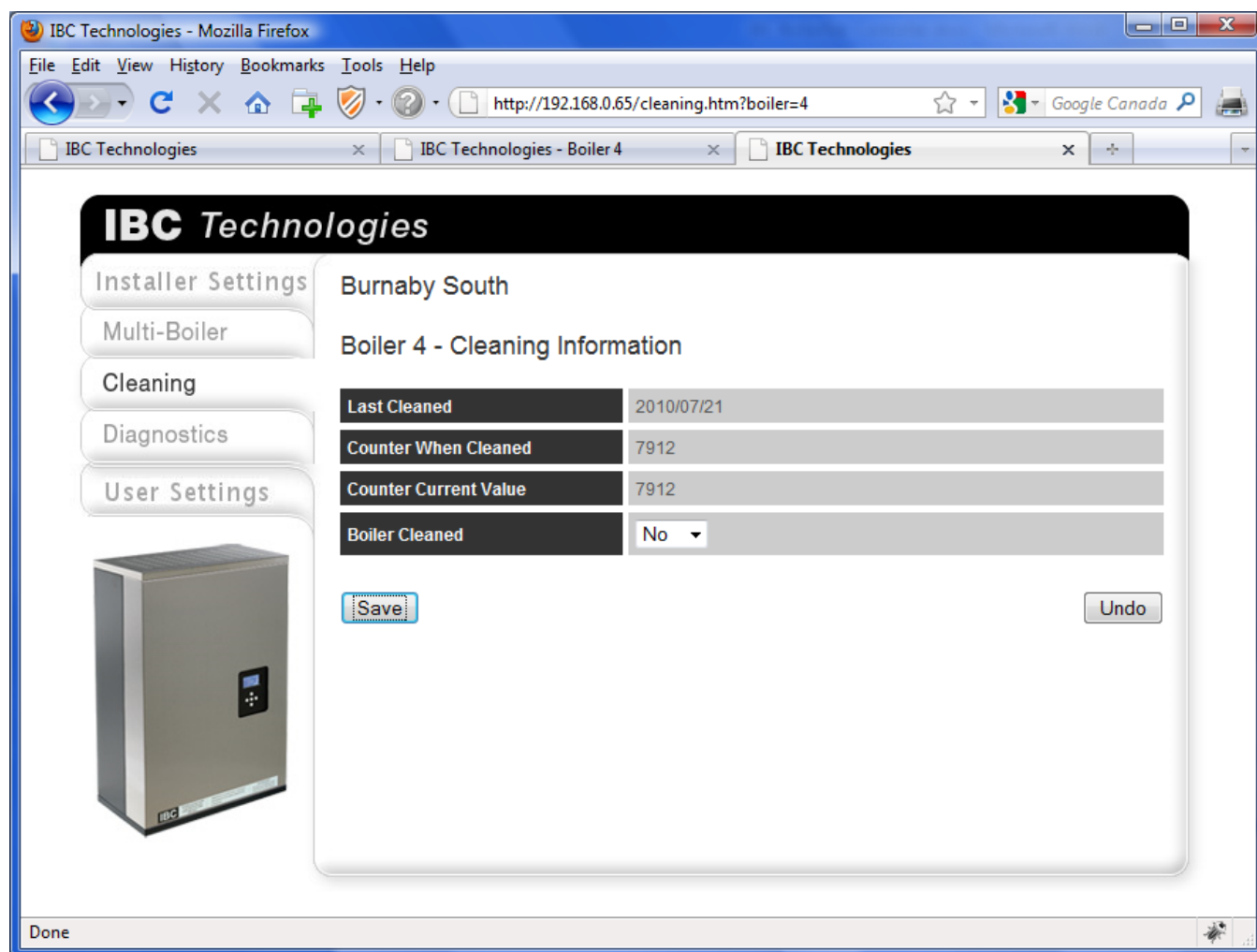


Figure 19

- When the boiler has been cleaned, select "Yes" from the "Boiler Cleaned" pull-down, and then click "Save". The "Cleaning Counter" will then be reset, and the "Last Cleaned" date updated.
- The cleaning intervals are factory set, but can be adjusted by your installer for your site conditions and/or requirements.

4.13 Diagnostics

This screen is intended for use by, or on the advice of, IBC or other qualified service personnel only. "Supervisor" or higher security rights are required to access this screen. Do not alter any value on this screen unless directed to do so by IBC technical personnel.

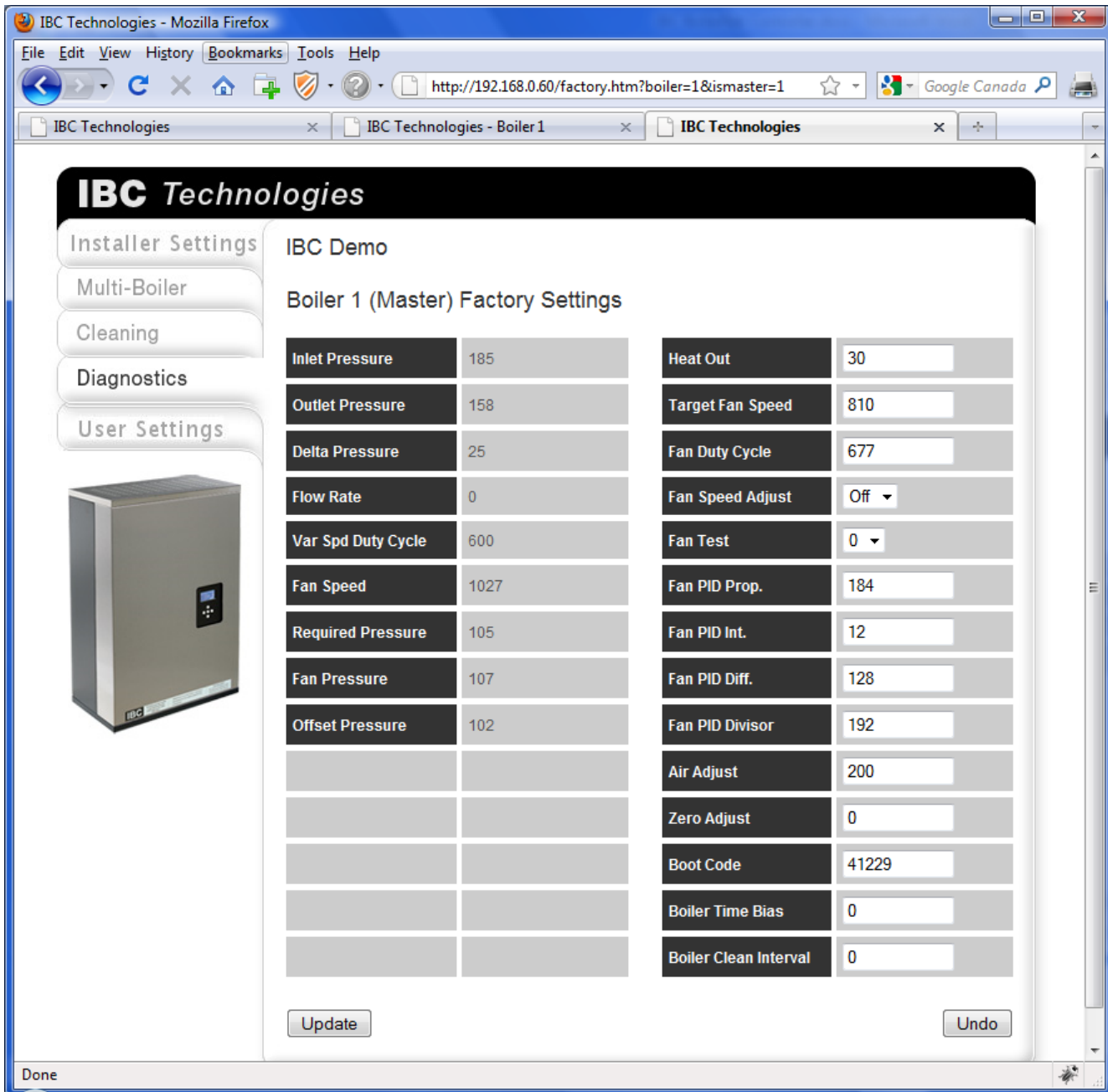


Figure 20

4.14 Boiler Logs

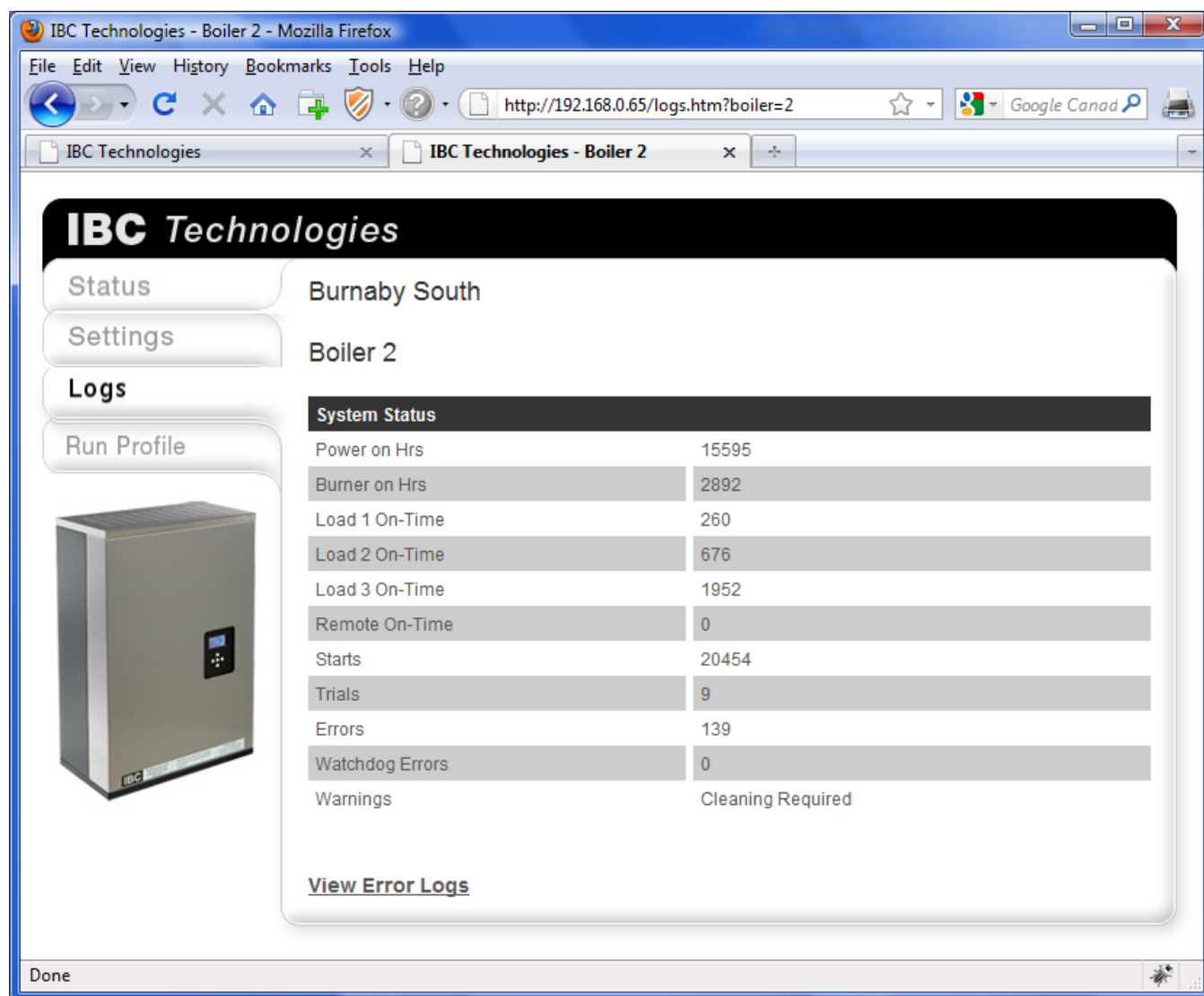


Figure 21

- Note that in this particular example, the boiler was not configured for a Remote Load; therefore the "Remote On-Time" is zero.

4.15 Boiler Error Logs

Each boiler maintains a log of the last 8 "event" and "watchdog" errors that have occurred on it. The information in the logs is mainly intended for use by IBC service personnel. If you notice errors are frequently occurring, you should contact your installer or IBC service personnel. This may indicate a site problem that needs to be addressed, or a setting in the boiler that needs to be adjusted. Also refer to section "4.4 - Site Log", which may indicate other site issues which could require attention.

IBC Technologies - Boiler 1 Error Log - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.0.60/error.htm?boiler=1

IBC Technologies - Boiler 1

IBC Technologies

Logged Errors for Boiler 1

Error	Time	Date	Soft Error 1	Soft Error 2	Hard Error	Fan Duty Cycle	Inlet °C	Outlet °C	Board °C	Diff. PSI	Inlet T Rate	Outlet T Rate	Outlet PSI
1	08:12:25	07/09/2010	0	64	0	1611	92	88	113	196	0	0	99
2	08:19:25	07/09/2010	0	64	0	1594	93	89	116	197	0	0	101
3	08:20:44	06/14/2010	0	64	0	1519	90	80	102	195	12	0	104
4	11:08:07	06/16/2010	0	8	0	3500	149	135	105	368	23	46	167
5	13:07:05	06/22/2010	0	8	0	1604	155	136	109	197	53	91	175
6	13:27:34	06/23/2010	0	0	1	993	214	205	124	154	7	-7	168
7	08:04:19	07/09/2010	0	64	0	1593	92	88	108	194	0	0	98
8	08:05:26	07/09/2010	0	64	0	1626	92	88	108	194	0	0	98

Watchdog Errors

Error	Time
1	00:00:00
2	00:00:00
3	00:00:00
4	00:00:00
5	00:00:00
6	00:00:00
7	00:00:00
8	00:00:00

- ☐ Inlet Pressure
- ☐ Outlet Pressure
- ☐ No water Flow
- ☐ Ignition Module
- ☐ Temperature Probe
- ☐ AC Crossing
- ☒ No Pressure
- ☐ Max. Temp. Diff.

Done

Figure 22

4.16 Run Profile

This screen provides a graphical summary of the time the boiler used servicing each of the Loads, as well as the modulation (or throttle) percentage being used while servicing each of the individual loads.

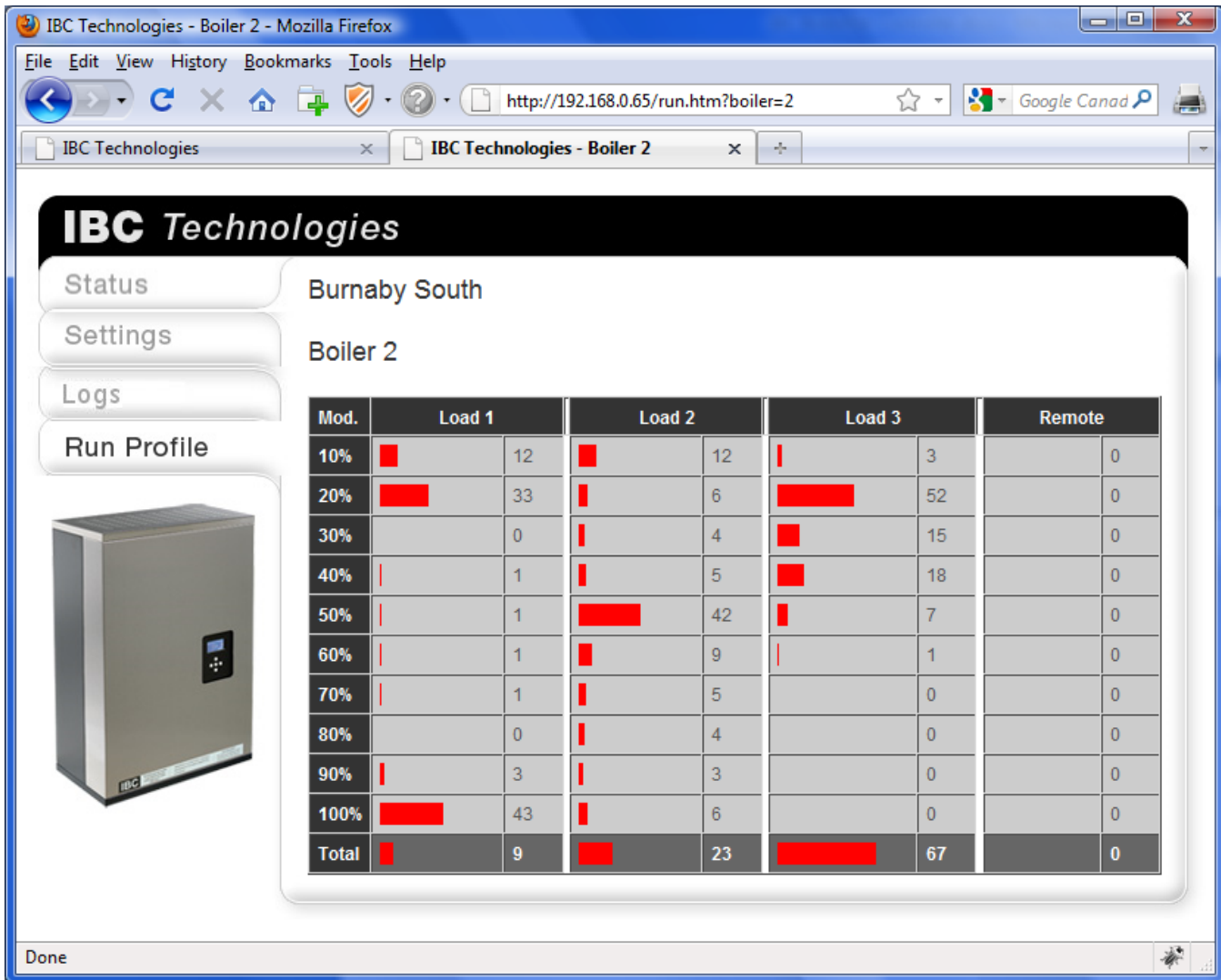


Figure 23

- In the above example, the boiler spent 9% of its "Burner On" time servicing Load #1; 23% of its time servicing Load #2; and 67% of its time servicing Load #3.
- Of the time it spent servicing Load #1, 12% of that time was at 10% modulation (throttle); 33% was at 20% modulation, etc.
- In this particular example, the boiler was not configured for a Remote Load; therefore all the Remote Load values are zero.
- Note that due to rounding in the calculations, the totals may not add up to exactly 100%.

5 BACnet Interface

The BoilerNet Interface Controller provides BACnet "Server" functionality over a BACnet/IP interface.

To make use of the BIC II's BACnet capabilities, a properly configured BACnet Operator's Workstation or BACnet Web Server software package is required. The BoilerNet Interface Controller has been tested using the Reliable Controls® RC-Studio Operator's Workstation V2.0 release 1.54, though any certified BACnet Operator Workstation (B-OWS) or BACnet server software package should work as well.

5.1 Site Requirements

Please refer to section **"3 - Installation"** for site installation requirements. Site parameters also must be setup correctly; refer to section **"1.3 - Configuring Site and Alert Data"**.

It should be noted that the BIC II does not provide any BBMD, foreign device, or other BACnet routing support. Please contact your Network Administrator or your BACnet Systems Integrator for more information and assistance.

A properly configured BACnet Operators Workstation or BACnet Web Server software package is required to access the BoilerNet Interface Controller's BACnet features.

An example of a BACnet object list obtained from a BoilerNet Interface Controller is shown below:

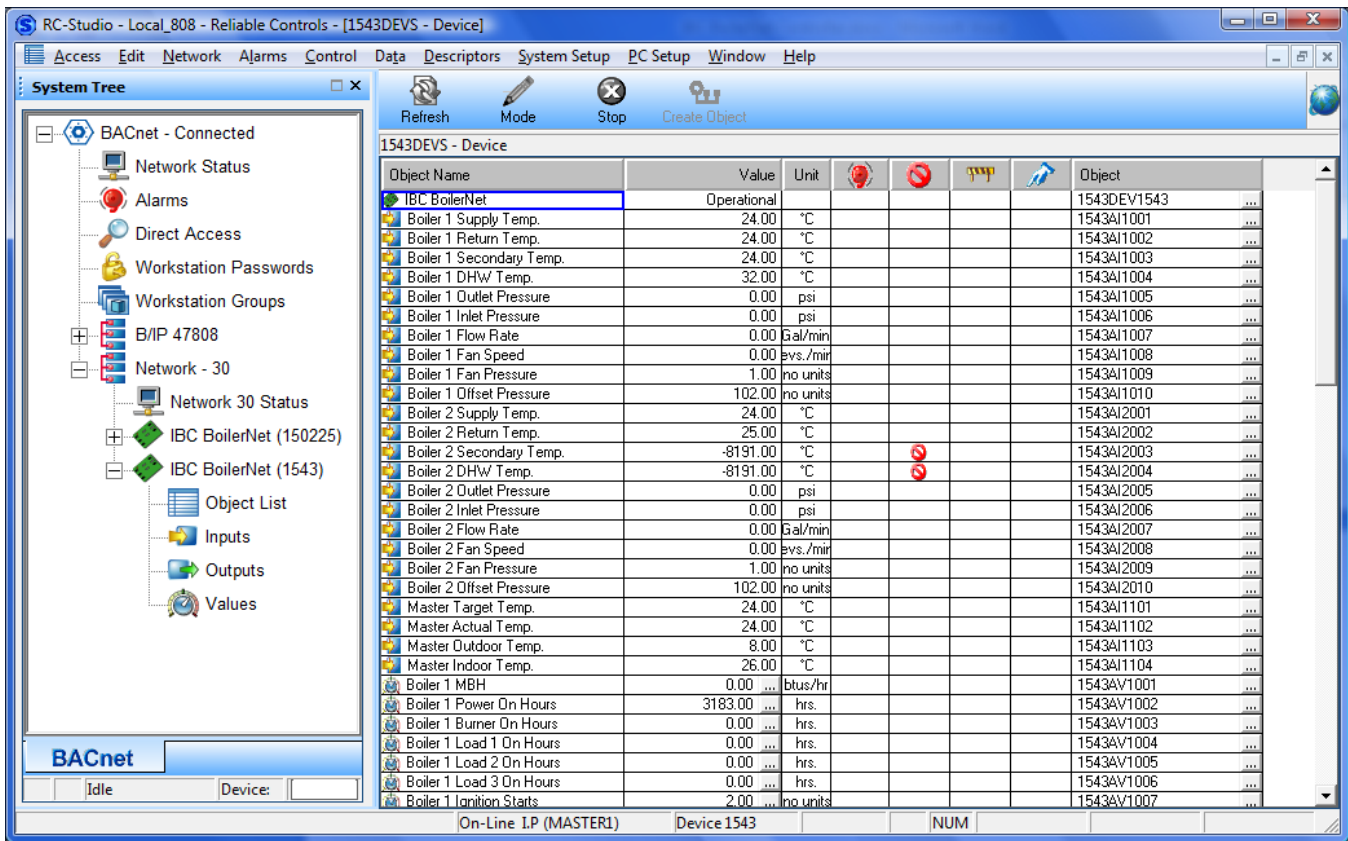


Figure 24

An example of the sort of customized display that can be setup for use with your B-OWS software package is shown below:

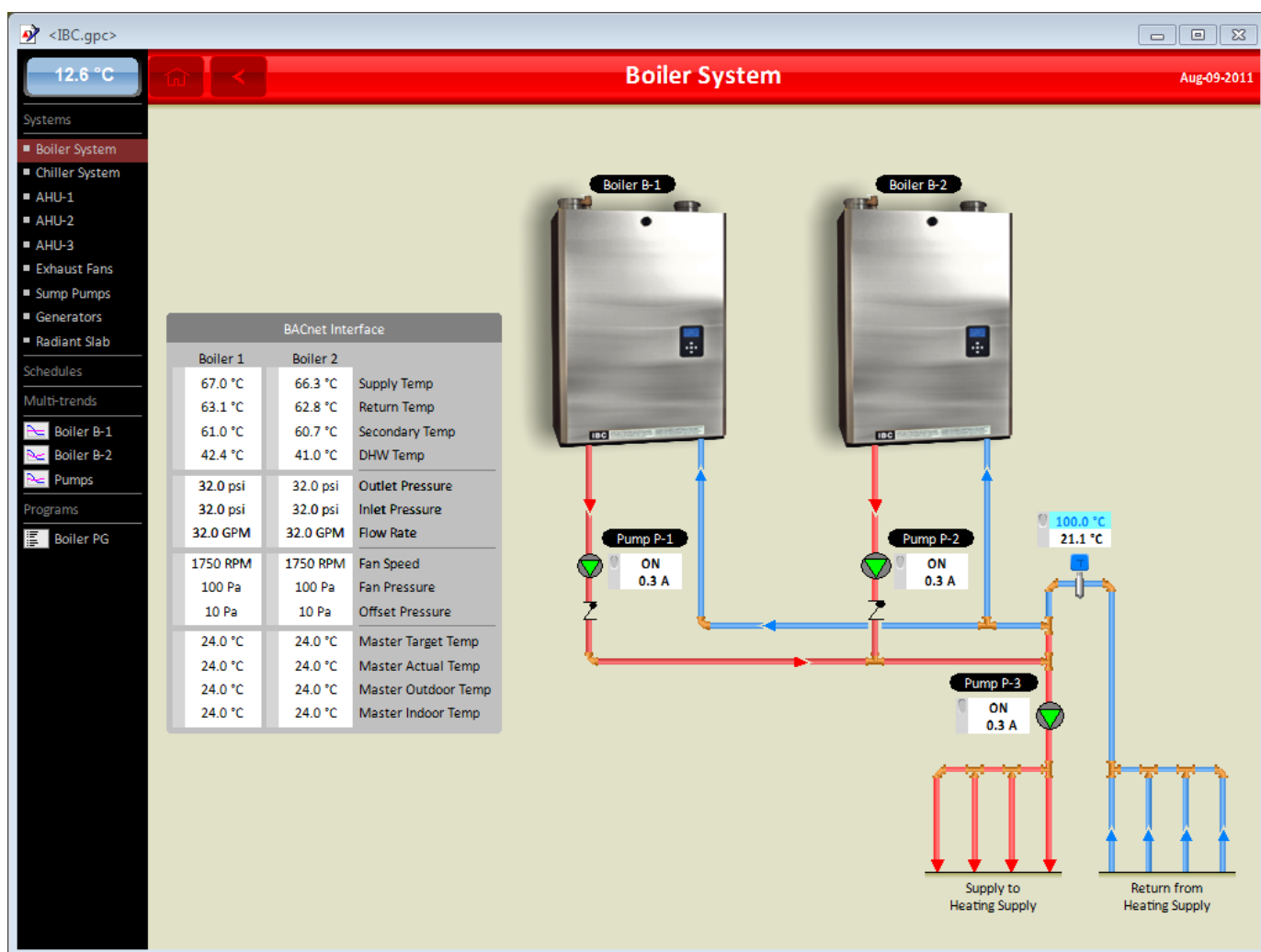


Figure 25

Of course, much more elaborate system and status displays can be developed. The actual configuration and use of the BACnet Operator Workstation software will be specific to your site and your software package.

The integration of the BoilerNet Interface Controller and the IBC boilers into a new or existing BACnet installation will be dependent on your particular site and the BACnet software package(s) you are using, and therefore beyond the scope of this document. Any questions regarding the use and setup of the BACnet software package you are using, and the integration of the BACnet objects provided by the BIC II into your BACnet system should be referred to the manufacturer of your BACnet workstation or server software, your Network Administrator, or your BACnet System Integration and Support organization.

5.2 BACnet Objects

The BoilerNet Interface Controller will provide a set of BACnet objects for each boiler on the network. There is also set of "Master" objects, which are associated with the boiler designated as the "Master" boiler.

Any BACnet object commands that require a password (e.g. the "Reinitialize Device" command), will use the password that has been setup for the "BACnet" user id. Please refer to **"4.1 - User Passwords"** for information on setting up the BACnet User Id.

Table 4 – Boiler Objects

Object Name	Value	Units	Object ID	Commandable	Notes
Boiler 1 Supply Temp.	22	°C	AI1001		
Boiler 1 Return Temp.	23	°C	AI1002		
Boiler 1 Secondary Temp.	22	°C	AI1003		
Boiler 1 DHW Temp.	60	°C	AI1004		
Boiler 1 Outlet Pressure	5.6	psi	AI1005		"SL" models excluded
Boiler 1 Inlet Pressure	5.7	psi	AI1006		
Boiler 1 Flow Rate	0	Gal/min	AI1007		
Boiler 1 Fan Speed	0	revs/min	AI1008		
Boiler 1 Fan Pressure	102		AI1009		
Boiler 1 Offset Pressure	102		AI1010		
Boiler 1 Stack Temp.	70	°C	AI1011		If equipped
Boiler 1 MBH	0	btus/hr	AV1001		
Boiler 1 Power On Hours	792	hrs	AV1002		
Boiler 1 Burner On Hours	100	hrs	AV1003		
Boiler 1 Load 1 On Hours	50	hrs	AV1004		
Boiler 1 Load 2 On Hours	25	hrs	AV1005		
Boiler 1 Load 3 On Hours	25	hrs	AV1006		
Boiler 1 Ignition Starts	99		AV1007		
Boiler 1 Ignition Trials	6		AV1008		
Boiler 1 Load 1 Cycles/Day	10		AV1009		
Boiler 1 Load 2 Cycles/Day	5		AV1010		
Boiler 1 Load 3 Cycles/Day	5		AV1011		
Boiler 1 Delta Pressure	0		AV1012		"SL" models excluded
Boiler 1 Required Pressure	154		AV1013		
Boiler 1 Var Speed Duty Cycle	0		AV1014		
Boiler 1 Remote On Hours	0	hrs	AV1015		
Boiler 1 Outdoor Temp.	5	°C	AV1016	✓	1
Boiler 1 Indoor Temp.	21	°C	AV1017	✓	1

Object Name	Value	Units	Object ID	Commandable	Notes
Boiler 1 Supply Setpoint	60	°C	AV1018	✓	1
Boiler 1 Remote Input	50	%	AV1019		
Boiler 1 Inlet/Outlet Sensor	OK		BV1001		
Boiler 1 Remote Loop Sensor	OK		BV1002		
Boiler 1 Cleaning Required	No		BV1003		
Boiler 1 Anti-Cycling	Not Active		BV1004		
Boiler 1 Short Cycling	Not Active		BV1005		
Boiler 1 Comm. Status	Online		BV1006		
Boiler 1 Master Boiler	Yes		BV1007		
Boiler 1 Primary Pump	Off		BV1008		
Boiler 1 P/V 1	Off		BV1009		
Boiler 1 P/V 2	Off		BV1010		
Boiler 1 P/V 3	Off		BV1011		
Boiler 1 Occupied	Yes		BV1012	✓	2
Boiler 1 Setback 1	Disabled		BV1013	✓	2
Boiler 1 Setback 2	Disabled		BV1014	✓	2
Boiler 1 Setback 3	Disabled		BV1015	✓	2
Boiler 1 Enable	Enabled		BV1016	✓	2
Boiler 1 Thermostat 1	On		BV1017	✓	1
Boiler 1 Thermostat 2	Off		BV1018	✓	1
Boiler 1 Thermostat 3	Off		BV1019	✓	1
Boiler 1 Operating Status	Standby		MV1001		
Boiler 1 Error Message	None		MV1002		
Boiler 1 Service Mode	Normal		MV1003	✓	2
Boiler 1 Boiler Model	45-225		MV1004		
Boiler 1 Load 1 Type	Set Point		MV1005	✓	2
Boiler 1 Load 2 Type	Off		MV1006	✓	2
Boiler 1 Load 3 Type	Off		MV1007	✓	2

Table 5 – Master Objects

Object Name	Value	Units	Object ID	Commandable	Notes
Master Target Temp.	22	°C	AI1101		
Master Actual Temp.	22	°C	AI1102		
Master Boilers Responding	4		AV1101		
Master Boilers Firing	1		AV1102		
Master Outdoor Temp.	10	°C	AV1103	✓	1
Master Indoor Temp.	21	°C	AV1104	✓	1
Master Supply Setpoint	60	°C	AV1105	✓	1

A master boiler must be defined in the system for these objects to be available.

Table 6 – Miscellaneous Objects

Object Name	Value	Units	Object ID	Commandable	Notes
IBC BoilerNet			DEV		

- 1) If BACnet communications is lost for a period of 5 minutes, then these objects will revert to their non-commanded (relinquish) values.
 - 2) Altering the object's value will alter the saved value in the boiler's controller; sending a relinquish command or a loss of BACnet communications will not restore the setting to its previous state.
- Values shown are examples only.
 - Each boiler in the network will have its own list of "Boiler Objects"; Boiler #1 only is shown in the above example.
 - For any commandable objects, note that if there is operator activity on the boiler's keypad, then BACnet "write" commands for these settings will be locked out for 2 minutes after the last key press. This is to prevent conflicting operations between an operator on-site working on the boiler, and a remote operator.
 - The "Object ID" will be dependent on the BACnet software package you are using (the examples above are generated by the Reliable Controls® Operator's Workstation).
 - The actual "Object ID" numbers will be site specific.
 - Additional objects may be available, depending on the boiler and BIC II firmware versions in use and the configuration of the equipment at your site.
 - Certain objects may or may not be available depending on the boiler model and the firmware version installed.

5.3 Multi-value Objects

Table 7 – MV1001 – Operating Status

1	Standby
2	Purging
3	Igniting
4	Heating
5	Circulating
6	Error
7	Initialize
8	Service
9	Restart
10	Unknown

Table 8 – MV1002 – Error Message

1	None
2	Water High Limit Exceeded
3	Vent High Limit Exceeded
4	Ignition Failure
5	Aux. Interlock 1 Open
6	Aux. Interlock 2 Open
7	Low Air Flow
8	No Water Flow
9	Low Water Pressure
10	Inlet Pressure Sensor
11	Outlet Pressure Sensor
12	Ignition Module
13	AC Crossing Error
14	Max. In-Out Temp. Exceeded
15	Loop/Indoor Sensor
16	Water High/Low Cutout
17	Vessel/Vent High Limit

Table 9 – MV1003 – Service Mode

1	Normal Operation
2	Service Standby
3	Restart

Table 10 – MV1004 – Boiler Model

1	Unknown
2	15-150
3	45-225
4	80-399
5	20-115

Table 11 – MV1005, MV1006, MV1007 – Load Type

1	Off
2	DHW
3	Reset Heating
4	Set Point
5	External Control
6	Manual Control
7	DHW Loop 2

6 Enclosure Installation Notes

- Please note that it is the responsibility of the installer to adhere to any electrical code requirements which may be applicable to the installation of this equipment. The installation must be performed only by qualified service personnel.
- The enclosure will need to be modified by the installer for routing the power and communications wiring to the electronic components.
- Please note that any damage to the BIC II, the boiler's controller board, or any other equipment connected directly or indirectly to the system caused by improper handling, installation, or wiring will not be covered by warranty, and is the sole responsibility of the installer.
- The electronics modules (control boards) can be damaged by static-electric discharge; anti-static precautions must be used when handling. If the electronics module is mounted to a backplane, then handle the electronics assembly by the metal back-panel only; avoid touching the electronics module itself.
- Remove the electronics module from the enclosure before making any modifications to the enclosure. If the control board is mounted on a back plane, remove the entire backplane; leave the control board mounted on the backplane.
- Be sure to put the electronics assembly in a safe place while making the enclosure modifications; in an anti-static bag if possible.
- The AC supply lines should be separated from the BoilerNet twisted pair and the Ethernet wiring to prevent possible electrical interference to the network wiring. The use of shielded cables is generally recommended.
- **IMPORTANT:** Be sure to remove and thoroughly clean all metal filings from the enclosure after the modifications have been made.
- When possible, the enclosure should be mounted in position before remounting the electronics assembly in the enclosure.

Please refer to sections **"3.3 - BoilerNet Connections"** and **"3.4 - Configuring the Boilers"** for additional information regarding the BoilerNet wiring.

7 Troubleshooting Notes

- As mentioned in section **"3.3 BoilerNet Connections"**, BoilerNet uses a CAN-bus interface for communicating between the boilers and the BIC II. The wire type and installation must comply with CAN-bus standards such as ISO 11898 and/or SAE J2284.
- Again referring to section **"3.3 BoilerNet Connections"**, the terminators must be removed from the middle boilers, and the wire polarity must be correct at all the boilers and the BIC II. The BIC II must be on the end of a BoilerNet communications chain.
- All boilers must be powered on and have a unique Boiler ID assigned to them before the BIC II is powered on. The BIC II checks for the on-line boilers as it starts up.
- Make sure there is only one boiler configured as the master (typically boiler #1). The boilers will not function correctly if there is more than one boiler assigned as the master, and the BIC II will not properly recognize the boilers.
- Very occasionally, the boilers need to be power cycled after the boiler ID's and master boiler have been assigned. Turn off all the boilers and the BIC II, then power on the boilers one at a time, starting with the master; power on the BIC II last.
- The BIC II uses BACnet/IP; not BACnet Ethernet. Check that the BACnet devices you are interfacing to are configured correctly.
- A BACnet BBMD routing device is required if interfacing BACnet devices on different network segments and/or subnets. Most standard routers will not properly route BACnet/IP packets.
- Check that the correct firmware version is on each boiler; it needs to be at least V3.00.0 or newer, and all boilers should have the same firmware version installed. (Hint: the firmware version is displayed as the boiler powers up, and also in the "Installer Setup" – "System Information" screen in V3 firmware.)
- On the "Master Boiler", go into the "Advanced Diagnostics" menu; near the bottom of this screen it will show "Net. Boilers Online", which should be the number of boilers installed at your location. If this does not match, then this typically indicates a BoilerNet wiring problem or that a boiler has not been assigned a Boiler ID. Also check the "Net. Boilers Available". This should also equal the number of boilers at your site, unless a boiler is servicing a local heat call and has "Opted Out".
- In V3.00.7 or newer firmware, the communications status with the BIC will also be displayed in the "Advanced Diagnostics" menu.
- Make sure the header is properly attached to the BIC II controller card.

8 Bootloader Configuration

This is an optional step that will shorten the start-up time of the BIC II controller board in some specific situations.

A bootloader comes pre-installed in the controller's Flash memory, which is a customized version of U-Boot. U-Boot has several environment variables which it uses, which are also saved in the controller's Flash memory. One of these environment variables can be altered to reduce the start-up time in some particular cases.

It should be noted that not altering this environment variable will not affect the operation of the BIC II; it only shortens the start-up time in some particular installations. In an installation with no DHCP server present and accessible to the BIC II, the start-up time will go from approximately 1 minute and 15 seconds to approximately 4 minutes and 30 seconds if this environment variable is not altered.

Setting the U-Boot Environment Variable

- A terminal program, such as Hyper-terminal, or another "standard" terminal program, is needed, in addition to a RS232 serial port on the computer being used.
- Connect a "null" modem cable between the computer and the BIC II controller board.
- Set the appropriate serial port on the computer to 115,200 bpi, 8 data, 1 stop, no parity, and (typically) no handshaking.
- Apply power to the BIC II (or press the "reset" button). You should see something similar to the following on the screen:

```
Texas Instruments X-Loader 1.46 (Nov 29 2010 - 23:10:41)
Starting OS Bootloader...
```

```
U-Boot 2009.11-00005-ge83d2db (Dec 07 2010 - 11:55:34)
```

```
OMAP34xx/35xx-GP ES1.0, CPU-OPP2 L3-165MHz
Craneboard + LPDDR/NAND
```

```
I2C: ready
```

```
DRAM: 256 MB
```

```
NAND: 256 MiB
```

```
In: serial
```

```
Out: serial
```

```
Err: serial
```

```
Die ID #0b96000100000000015da3961501701e
```

```
Net: davinci_emac_initialize
```

```
Ethernet PHY: GENERIC @ 0x00
```

```
EMAC LSB = 0x001066dd
```

```
EMAC MSB = 0x00080028
```

```
-----
EMAC ID 08:00:28:10:66:dd
-----
```

```
DaVinci EMAC
```

```
Hit any key to stop autoboot: 0
```

- Press any key within 3 seconds to enter the bootloader configuration menu. You then see the prompt:

```
AM3517_CRANE #
```

- Type, or preferably copy and paste, the following line (all one line):

```
setenv mmcargs setenv bootargs console=${console} root=/dev/mmcblk0p2 rw rootfstype=ext3 rootwait eth=${ethaddr}
```

Press the "enter" key once the line is entered; you should then get the "AM3517_CRANE # " prompt again.

- Enter the following command, again followed the the "enter" key:

```
saveenv
```

You should then see something similar to this displayed:

```
Saving Environment to NAND...
Erasing Nand...
Erasing at 0x260000 – 100% complete.
Writing to Nand... done
AM3517_CRANE #
```

- Enter the following command, followed by the "enter" key:

`printenv`

You should see something similar to the following:

```
printenv
bootcmd=if mmc init; then if run loadbootscript; then run bootscript; else if run loaduimage; then run mmcboot; else
run nandboot; fi; fi; else run nandboot; fi
bootdelay=3
baudrate=115200
bootfile=ulmage
loadaddr=0x82000000
console=ttyS2,115200n8
nandargs=setenv bootargs console=${console} root=/dev/mtdblock4 rw rootfstype=jffs2 eth=${ethaddr} ip=dhcp
loadbootscript=fatload mmc 0 ${loadaddr} boot.scr
bootscript=echo Running bootscript from mmc ...; source ${loadaddr}
loaduimage=fatload mmc 0 ${loadaddr} ulmage
mmcboot=echo Booting from mmc ...; run mmcargs; bootm ${loadaddr}
nandboot=echo Booting from nand ...; run nandargs; nand read ${loadaddr} 480000 500000; bootm ${loadaddr}
dieid#=0b96000100000000015da3961501701e
ethact=DaVinci EMAC
filesize=F40000
serverip=192.168.1.8
ipaddr=192.168.1.9
ethaddr=08:00:28:10:66:dd
mmcargs=setenv bootargs console=ttyS2,115200n8 root=/dev/mmcblk0p2 rw rootfstype=ext3 rootwait
eth=08:00:28:10:66:dd

Environment size: 948/131068 bytes
AM3517_CRANE #
```

The line starting with "mmcargs" is the one to check. The numbers after "eth=" will be different, and most importantly, the line **should not** end with "ip=dhcp".

The BIC II environment variables are now configured, and the controller board is ready for use again. Hit the reset button, or disconnect and reconnect the power.

9 Technical Specifications

Processor

- 600MHz ARM Cortex A8

Memory

- 256MB RAM
- 256MB Flash
- File system via SD Flash card for data collection and future applications; 2GB minimum with SDHC support.

Power Requirements

- Controller board: 5VDC @ 7.5W
- 120VAC and 100 to 240 VAC power supply options are available
- Power Over Ethernet (PoE) capable

Enclosures

- NEMA and standard enclosure options are available

Communications

- IEEE 802.3 Ethernet 10/100 Base-T interface
- TCP/IP v4 (v6 capable)
- BACnet/IP via Ethernet interface
- BoilerNet 2-wire interface via CAN-bus supports up to 24 IBC boilers

Features

- Web Server for IBC BoilerNet
- BACnet/IP Server for IBC boilers
- FTP and Telnet Services